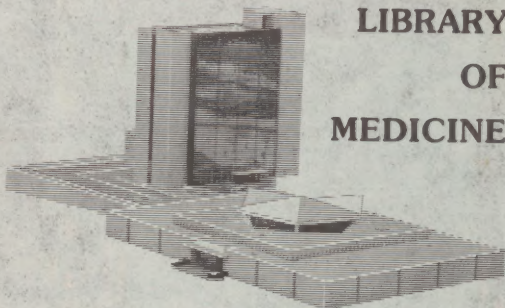


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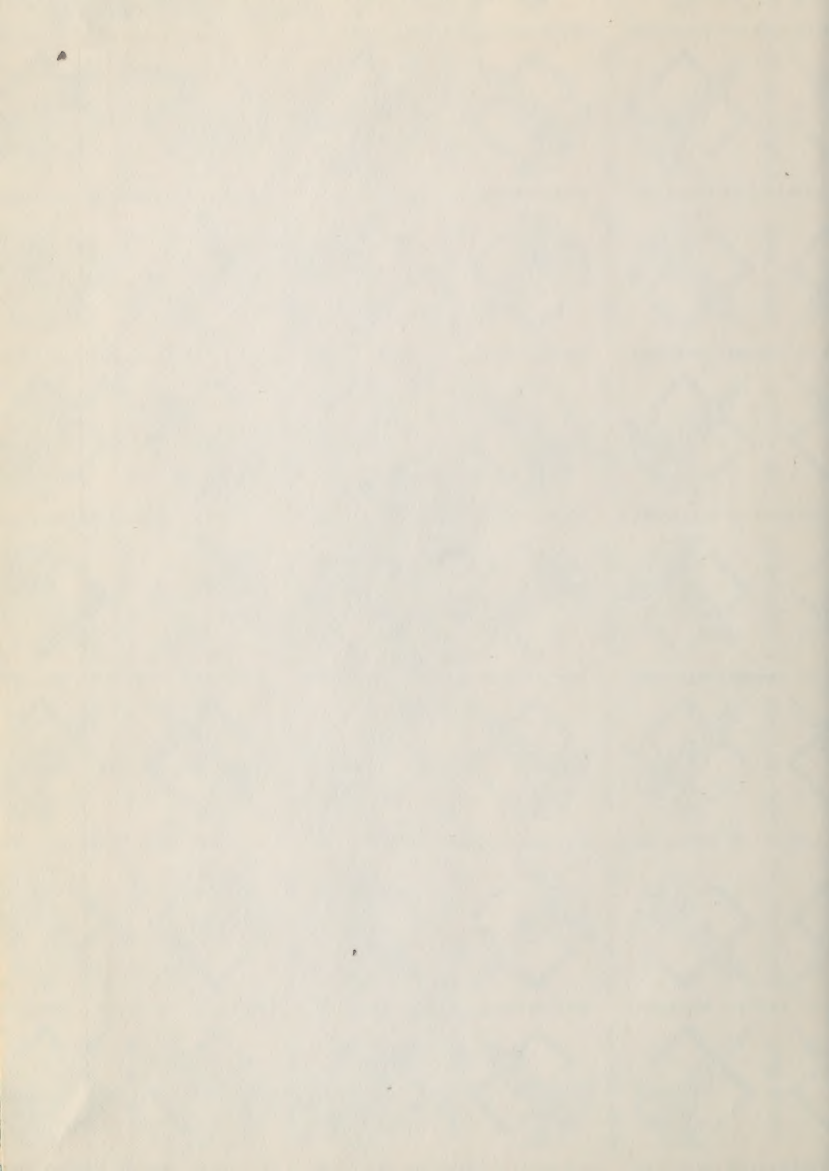


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GRAY'S PRESCRIPTIONIST

REVISED

A TREATISE

ON THE ART OF READING AND COMPOUNDING PHYSICIANS'
PRESCRIPTIONS, WITH TABLES OF WEIGHTS AND
MEASURES, ANTIDOTES, ABBREVIATIONS, ETC.

BY

H. C. GRAY, PH. G.

Author of "Gray's Pharmaceutical Quiz Compend," "Gray's Elements of
Pharmacy," and "Gray's Clinical Urinalysis."

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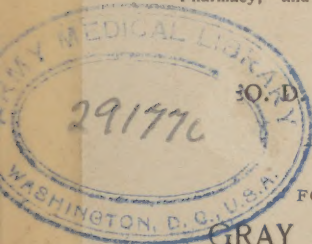
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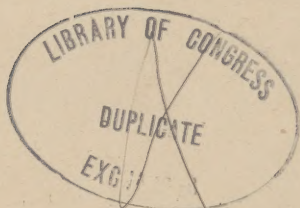
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PREFACE.

THIS volume was prepared and has been revised for the purpose of aiding those young men who are unable to attend a school of pharmacy, to thoroughly qualify themselves for the prescription business and necessary adjuncts.

It is not put forth as an exposition of original scientific research, neither is it claimed to be a compendium of pharmaceutical knowledge.

It is intended as a compilation of facts related to the art of dispensing and theory of compounding prescriptions, augmented with observations and opinions of the writer, gained during many years of practical experience in this line of work.

CHICAGO, July 1, 1896.

THE AUTHOR.

INTRODUCTION.

A THOROUGH practical knowledge of pharmacy was never more essential to those engaged in the profession than at the present time.

The art of dispensing generally, and particularly the compounding and dispensing of physicians' prescriptions, comprises the most important branch of the retail drug business.

In times past this was a second consideration in most stores, particularly those in country towns; at present, however, conditions are different; changes have come and others are quite likely to come, which will result in a revolution in pharmacal customs. About all that will be left to the druggist will be the prescription business and the retail of drugs proper.

It is to be hoped that such *will* be the case, and that enough competition will be crushed by the Department-store Jugernaut to enable the "fittest" who survive to practice *pharmacy* and rank above the ordinary patent medicine vender.

PART I.

WEIGHTS AND MEASURES.

Upon beginning the study of pharmacy the first important subject demanding the student's attention is that of weights and measures.

Definitions.—Weight is the measure of gravity; this measure is obtained by comparing the gravitating force with some arbitrary, yet well known, standard. Measure is the determination of extent, or bulk, and must also be ascertained by the use of standards or "measures."

There is always a direct ratio of weight to bulk or volume; this is called *specific gravity* or *specific weight*; the proportion of bulk or volume to weight is called *specific volume*.

General Remarks.—No intelligent conception of the meaning of these terms is possible without the use of some system of comparison, based on a standard, the value of which is well known. All standards are necessarily arbitrary.

Formerly, for many centuries, these standards were closely associated with common, natural objects, such as the grain (of wheat), the foot, hand, ell, span, pace, etc., etc.

With the rapid progress of knowledge, it became apparent that all such terms were too ambiguous; it was also necessary to have some standard that could be regained if lost or destroyed.

Such a standard must be based on some absolute scientific fact or principle. A standard was obtained in Great Britain about seventy years ago, after a hundred years of alternate determinations and revisions.

This standard, which is the theory or starting point of all the systems and denominations in use in Great Britain, and upon which the systems in use in this country too, are based, and from which our standard is copied, is the,

Standard Yard.

It was obtained by making comparisons with a second's pendulum; e. i., a pendulum which in a vacuum, at the sea level, in the latitude of London at 62° F., requires one second for a complete vibration. Such a pendulum was graduated into 39.1393 spaces; each space being one inch, and 36 spaces making the yard. These measures were engraved on gold studs set into a platinum bar, which is called the standard yard and is preserved in the Standards' office, a government department, which has all the other standards of measure and weight for safe keeping. Another business of that office is to furnish copies and measurements of such standards. The reading of the measurements is effected with microscopes having micrometer attachments, by the use of which the 100,000th part of an inch error can be detected.

All the standards of measure in this country are copied from those of Great Britain except the *gallon* or unit of fluid measure.

The gallon in use here, being the one used in Great Britain before the last revision in 1836, is equal to 231 cubic inches and is divided into 8 pints of 16 ounces each, while the British or imperial gal-

lon is based on the bulk of 10 pounds avoirdupois, of distilled water weighed in air at 62° F., the barometer at 30.

The *official* system of weights is the same in this country as in England, avoirdupois; while troy weight is used by druggists in both countries the same.

Remember in compounding that the amounts specified in recipes and formulas, as well as in physician's prescriptions, are all of troy or apothecaries' weight, while the goods are bought and sold by avoirdupois. Bear this in mind in pricing and don't confound $\frac{1}{8}$ ounce with 1 drachm.

Be very careful in using approximate measures for they are by no means exact.

If necessary to change metric measure or weight to British, refer to a table of equivalents. Such a table is given on pages 17-21.

TABLES OF WEIGHTS AND MEASURES.

Linear Measure.

1 yard = 3 feet = 36 inches.
1 foot = 12 inches.

Fluid Measure, Imperial.

Gallon.	Pint.	Fluidounce.	Fluidrachm.	Minim.
Conj. 1 =	O. 8 =	fl. $\frac{7}{8}$ 160 =	fl. 3 1280 =	M. 76800
	O. 1 =	fl. $\frac{7}{8}$ 20 =	fl. 3 160 =	M. 9600
		fl. $\frac{7}{8}$ 1 =	fl. 3 8 =	M. 480
			fl. 3 1 =	M. 60

U. S. or Apothecaries' Measure.

Gallon.	Pint.	Fluidounce.	Fluidrachm.	Minim.
Conj. 1 =	O. 8 =	fl. $\frac{7}{8}$ 128 =	fl. 3 1024 =	M. 61440
	O. 1 =	fl. $\frac{7}{8}$ 16 =	fl. 3 128 =	M. 7680
		fl. $\frac{7}{8}$ 1 =	fl. 3 8 =	M. 480
			fl. 3 1 =	M. 60

At 60° F. the U. S. fluidounce of distilled water weighs 455.7 grains.

Avoirdupois Weight.

1 lb.	=	16 oz.	=	256 drachms	=	7000	grains.
		1 oz.	=	16 drachms	=	437½	grains.
				1 drachm	=	27 ⁸ / ₁₀	grains.

The drachm is a denomination seldom used in avoirdupois at present.

Troy or Apothecaries' Weight.

1 lb	=	5 12	=	3 96	=	288	gr.	5760
		3	=	3 8	=	24	gr.	480
				3 1	=	3	gr.	60
						1	gr.	20

Approximate Measures.

1 drop	=	1 minim	=	(1 gr. distilled water 60° F.)
60 drops	=	fl. 3 j		
1 teaspoonful	=	fl. 3 j		
2 teaspoonful	=	fl. 3 ji		
4 teaspoonful	=	tablespoonful	=	fl. 3 ss.
1 wineglassful	=	fl. 3 ji		
1 teacupful	=	fl. 3 jv		
1 tumbler	=	fl. 3 vji		
1 pint	=	1 lb. av.		
2 pints	=	1 Liter or kilogram of water.		

THE METRIC SYSTEM.

General Remarks.—Since the last edition of this book, the Metric System of weight and measure has been adopted by the United States Pharmacopœia. This system, though it is not compulsory to use it, is legal in this country and is coming into general use more and more each day. It is not used in country towns so much as in cities, but it is very essential that the druggist acquire at least a practical knowledge of its units, their values and how to convert amounts expressed by denominations of the system, into denominations of the British system and vice versa.

Its Value.—The Metric System or Metrical System, so named from its unit the Meter and sometimes termed the Decimal System from the fact that its denominations are expressed by, and increase and decrease in multiples of ten (decem, meaning ten), has for its theory or basis the Meter, supposed to equal the $\frac{1}{40000000}$ part of the earth's circumference through the poles.

Its Origin.—It originated in France during the revolution a little more than one hundred years ago. It was established in that country during the consulate of Napoleon Bonaparte, and was adopted by all countries dependent on or subservient to France, later. At the downfall of the empire and Napoleon

I. the Metric System ceased to be legal in all those countries except Belgium.

In 1840, however, France permanently adopted it, and since then all the civilized nations of the world, except Russia, Great Britain, and the United States, use it exclusively, while scientists in even these countries use it altogether; it is legal, though not compulsory in both Great Britain and the United States; Russia alone not recognizing it.

Its Future.—The probabilities are strongly in favor of its being made compulsory in all legal transactions and commerce generally, in the United States before another ten years.

It is destined in time to become universal; once learned, its advantages cannot fail to be appreciated; they exist in its simplicity and the ease with which calculations by it may be made, and its agreeing with our decimal system of arithmetic.

Practical Uses.—Any number or part of any denomination of measure or weight in this system can be divided or multiplied, reduced or converted into other denominations, by simply moving the decimal point to the right or left.

All the denominations bear the simplest relation to the unit of the system.

The Standards of the System.—The standards are, the *standard meter*, of the International Metric Bureau, its fractions and multiples thereof; the *standard kilogram*, its fractions and multiples thereof; and the *Liter*, declared to be the cube of one-tenth of the meter and to contain one kilogram of distilled water at 4° C. in a vacuum.

The actual standard is a line drawn on a platinum-iridium bar forty inches long; the division measure

ments on this bar are engraved, and for exact reading in comparisons, microscopes with micrometer attachments are used.

Units and their Equivalents.—*The Meter* equals 39.37079 inches, practically 3 feet $3\frac{3}{8}$ inches.

The Liter is the cube of $\frac{1}{10}$ of the meter; it holds 1,000 grammes of distilled water at 4°C.

The Gramme is the weight of the amount of distilled water required to fill when at 4°C, the cube of the $\frac{1}{10}$ part of the meter; it equals 15.43235639 grains. In practice, beyond the fourth decimal figure is not used.

Learning the System.—The great trouble in getting people to learn the metric system is that in childhood they have learned the British systems and know the value of the denominations expressed in these terms by comparison with ordinary and well known objects, and also weights and measures, as 1-foot rules, yard-sticks, pint, quart, half gallon and gallon measures, etc.

There are no such domestic measuring utensils with metric graduations, hence in using or trying to use the metric system they figure by it but think by the old method, and confusion results.

Every drug store should have a complete set of metric weights from kilogramme down, and measures from the liter down.

Use of Weights and Measures in Practice.—A few days' use of metric weights and measures with a reasonable amount of experience in dispensing and compounding by the system, *with* the weights and measures, will teach even the dullest person the mysteries of the metric system.

Not until one learns it this way, or has learned it in childhood will they know it practically. The use

of the system in the Pharmacopœia is nonsensical if you must stop and convert each amount to the denominations of the British system and weigh or measure thereby. These calculations, usually made with more or less haste are liable to result in error.

To Convert Metric Weights or Measures into those in Ordinary Use.

RULE.—Multiply the metric quantities by the corresponding equivalents. **Ex.**—The equivalent of one meter is 39.370 + inches, and five meters would = 196.85 inches: $39.370 \times 5 = 196.85$.

To convert:

Meters	into inches	multiply by	39.370
Centimeters	" "	" "	0.3937
Millimeters	" "	" "	0.03937

As one liter, or 1000 Cc., is equal to 33.8149 + fluidounces, or 35.235 + imperial fluidounces, to convert:

Liters	into fluidounces	multiply by	33.815
Cubic centimeters	" "	" "	0.0338
Liters	" pints	" "	2.113
Liters	" imperial pints	" "	1.7617
Liters	" imperial gallons	" "	0.2202
Cubic centimeters	" imperial fluidounces	" "	0.0352

As one gramme is equal to 15.432 + grains, or .03527 avoirdupois ounce, or .03215 troy ounce, to convert:

Grammes	into grains	multiply by	15.432
Centigrammes	" "	" "	0.15432
Milligrammes	" "	" "	0.015432
Kilogrammes	" avoirdupois ounces	" "	35.2739
Grammes	" avoirdupois ounces	" "	.03527
Kilogrammes	" avoirdupois pounds	" "	2.2046
Kilogrammes	" troy ounces	" "	32.1507
Grammes	" troy ounces	" "	.03215

To Convert the Weights and Measures in Ordinary Use into Metric Weights and Measures.

RULE.—Multiply the quantities by the corresponding metric equivalent.

As one inch is equal to 0.0254 meter, one fluid-ounce to 29.572 cubic centimeters, one imperial fluidounce to 28.3807 cubic centimeters, one grain to 0.0648 gramme, one avoirdupois ounce to 28.3495 grammes, and one troy ounce to 31.1035 grammes.

To convert:

	into	meters	multiply by	0.0254
Inches	"	centimeters	" "	2.5399
Inches	"	millimeters	" "	25.3997
Pints	"	liters	" "	0.4731
Fluidounces	"	cubic centimeters	" "	29.572
Imperial pints	"	liters	" "	0.5776
Imperial gallons	"	liters	" "	4.5409
Imperial fluidounces	"	cubic centimeters	" "	28.3807
Grains	"	grammes	" "	0.0648
Grains	"	centigrammes	" "	6.4799
Grains	"	milligrammes	" "	64.799
Avoirdupois ounces	"	kilogrammes	" "	0.02835
Avoirdupois ounces	"	grammes	" "	28.3495
Avoirdupois pounds	"	kilogrammes	" "	0.4536
Troy ounces	"	kilogrammes	" "	0.0311
Troy ounces	"	grammes	" "	31.1035

The prefixes which are used to signify multiples, or numbers greater than the unit, were derived from Greek words. For convenience in distinguishing from fractional denominations, these Greek prefixes are usually begun with a capital letter. The prefixes designating fractional parts of a unit are of Latin origin; the Latin prefixes are written with small letters for convenience in contradistinction from the Greek or multiple prefixes.

The following Mnemonic may be of aid in retaining this in the memory: **G**reek **I**ncreases, **L**atin **D**ecreases.

TABLES OF METRIC MEASUREMENTS.

LINEAR MEASURE.

1 Millimeter.....	.001	....	Meter, designated.....	1mm.		
1 Centimeter.....	.01	....	"	"	.....	1cm.
1 Decimeter.....	.1	....	"	"	.....	1dm.
1 Meter.....	1.	....	"	"	.....	1M.
1 Dekameter.....	10.	....	"	"	.....	1Dm.
1 Hectometer.....	100.	....	"	"	.....	1Hm.
1 Kilometer.....	1000.	....	"	"	.....	1Km.
1 Myriameter....	10000.....	....	"	"	.....	1Mm.

MEASURE OF CAPACITY.

1 Milli-liter....	.001	....	Liter, designated.....	1ml.		
1 Centi-liter....	.01	....	"	"	.....	1 cl.
1 Deci-liter....	.1	....	"	"	.....	1dl.
1 Liter.....	1.	....	"	"	.....	1L.
1 Deka-liter...	10.	....	"	"	.....	1Dl.
1 Hecto-liter ..	100.	....	"	"	.....	1Hl.
1 Kilo-liter....	1000.	....	"	"	.....	1Kl.
1 Myria-liter...	10000.	....	"	"	.....	1Ml.

WEIGHT.

1 Milligramme	.001	....	Gramme, designated..	1mg.
1 Centigramme	.01	....	"	.....1cg.
1 Decigramme	.1	....	"	.....1dg.
1 Gramme	1.	....	"	.....1Gm.
1 Dekagramme	10.	....	"	.....1Dg.
1 Hectogramme	100.	....	"	.....1Hg.
1 Kilogramme	1000.	....	"	.....1Kg.
1 Myriagramme	10000.	....	"	.....1Mg.

TABLE OF METRIC MEASURE WITH COR- RESPONDING EQUIVALENTS IN FLUID OUNCES AND FRACTIONS.

Cc.	Fluid ounces and fractions.	Cc.	Fluid ounces and fractions.
2000.	67.628	1035.080	35.
1900.	64.246	1005.506	34.
1892.7	64.	1000.	33.814
1800.	60.865	975.932	33.
1774.4	60.	950.	32.123
1700.	57.484	946.358	32.
1600.	54.102	916.875	31.
1500.	50.721	900.	30.432
1478.685	50.	887.211	30.
1449.111	49.	857.637	29.
1419.538	48.	850.	28.742
1400.	47.339	828.064	28.
1389.964	47.	800.	27.051
1360.390	46.	798.490	27.
1330.817	45.	768.916	26.
1301.243	44.	750.	25.360
1300.	43.958	739.343	25.
1271.669	43.	709.769	24.
1242.095	42.	700.	23.670
1212.522	41.	680.195	23.
1200.	40.577	650.621	22.
1182.948	40.	621.048	21.
1153.374	39.	600.	20.288
1123.801	38.	591.427	20.
1100.	37.195	561.900	19.
1094.227	37.	550.	18.598
1064.653	36.	532.327	18.

Cc.	Fluid ounces and fractions.
502.753.....	17.
500.....	16.907
473 179.....	16.
450.....	15.216
443.606.....	15.
414.032.....	14.
400.....	13.526
384.458.....	13.
354.884.....	12.
350.....	11.835
325.311.....	11.
300.....	10.144
295.737.....	10.
266.163.....	9.
250.....	8.433
236.590.....	8.
207.016.....	7.

Cc.	Fluid ounces and fractions.
200.....	6.763
177.442.....	6.
150.....	5.072
147.869.....	5.
125.....	4.227
118.295.....	4.
100.....	3.381
90.....	3.043
88.721.....	3.
80.....	2.705
75.....	2.536
70.....	2.367
60.....	2.029
59.147.....	2.
50.....	1.691
40.....	1.353

TABLE OF METRIC MEASURE WITH EQUIVALENTS IN MINIMS.

Cc.	Minims.	Cc.	Minims.
31.	503.1	19.099.	310.
30.805.	500.	19.	308.4
30.190.	490.	18.483.	300.
30.	486.9	18.	292.2
29.537.	480.	17.867.	290.
29.	470.7	17.251.	280.
28.958.	470.	17.	275.9
28.341.	460.	16.635.	270.
28.	454.5	16.019.	260.
27.725.	450.	16.	259.7
27.109.	440.	15.403.	250.
27.	438.2	15.	243.4
26.493.	430.	14.787.	240.
26.	422.0	14.171.	230.
25.877.	420.	14.	227.2
25.261.	410.	13.555.	220.
25.	405.8	13.	211.0
24.645.	400.	12.938.	210.
24.029.	390.	12.322.	200.
24.	389.5	12.	194.8
23.413.	380.	11.706.	190.
23.	373.3	11.090.	180.
22.796.	370.	11.	178.5
22.180.	360.	10.474.	170.
22.	357.1	10.	162.3
21.563.	350.	9.858.	160.
21.	340.8	9.242.	150.
20.948.	340.	9.	146.1
20.332.	330.	8.626.	140.
20.	324.6	8.	129.8
19.716.	320.	7.393.	120.

Cc.	Minims.
7.	113.6
6.161.....	100.
5.545.....	90.
5.	81.2
4.929.....	80.
4.313.....	70.
4.	64.9
3.697.....	60.
3.081.....	50.
3.019.....	49.
3.	48.7
2.957.....	48.
2.896.....	47.
2.834.....	46.
2.773.....	45.
2.711.....	44.
2.649.....	43.
2.588.....	42.
2.526.....	41.
2.403.....	39.
2.341.....	38.
2.280.....	37.
2.218.....	36.
2.156.....	35.
2.095.....	34.
2.033.....	33.
2.	32.5
1.972.....	32.
1.910.....	31.
1.848.....	30.
1.787.....	29.
1.725.....	28.

Cc.	Minims.
1.664.....	27.
1.602.....	26.
1.504.....	25.
1.5	24.4
1.479.....	24.
1.417.....	23.
1.355.....	22.
1.25	20.3
1.232.....	20.
1.171.....	19.
1.109.....	18.
1.047.....	17.
1.	16.2
0.986.....	16.
0.924.....	15.
0.863.....	14.
0.801.....	13.
0.75	12.2
0.739.....	12.
0.678.....	11.
0.616.....	10.
0.555.....	9.
0.5	8.1
0.493.....	8.
0.431.....	7.
0.370.....	6.
0.308.....	5.
0.246.....	4.
0.185.....	3.
0.123.....	2.
0.06161.....	1.

TABLE OF METRIC WEIGHTS EQUIVA-
 LENT TO, FROM $\frac{9}{10}$ GRAIN DOWN
 TO $\frac{1}{100}$ GRAIN.

Gm.	Gr.	Gm.	Gr.
0.058	$\frac{9}{10}$	0.008	$\frac{1}{8}$
0.057	$\frac{89}{100}$	0.007	$\frac{9}{100}$
0.056	$\frac{89}{100}$	0.0065	$\frac{1}{10}$
0.055	$\frac{64}{100}$	0.0054	$\frac{1}{19}$
0.054	$\frac{56}{100}$	0.0042	$\frac{1}{15}$
0.052	$\frac{52}{100}$	0.0040	$\frac{1}{16}$
0.049	$\frac{49}{100}$	0.0036	$\frac{1}{18}$
0.045	$\frac{7}{10}$	0.0032	$\frac{1}{20}$
0.043	$\frac{43}{100}$	0.0027	$\frac{1}{24}$
0.040	$\frac{40}{100}$	0.0026	$\frac{1}{25}$
0.039	$\frac{39}{100}$	0.0022	$\frac{1}{30}$
0.036	$\frac{9}{18}$	0.0020	$\frac{1}{50}$
0.032	$\frac{32}{100}$	0.0018	$\frac{1}{36}$
0.028	$\frac{7}{18}$	0.0016	$\frac{1}{40}$
0.026	$\frac{26}{100}$	0.00135	$\frac{1}{48}$
0.022	$\frac{22}{100}$	0.00129	$\frac{1}{50}$
0.020	$\frac{5}{18}$	0.00108	$\frac{1}{60}$
0.016	$\frac{16}{100}$	0.00101	$\frac{1}{64}$
0.013	$\frac{13}{100}$	0.00090	$\frac{1}{72}$
0.012	$\frac{3}{16}$	0.00081	$\frac{1}{80}$
0.011	$\frac{11}{100}$	0.00065	$\frac{1}{100}$
0.009	$\frac{9}{100}$		

SPECIFIC GRAVITY.

Definition.—Specific gravity or specific weight is the relation of weight to volume or bulk. It is obtained by comparison with some arbitrary but commonly accepted standard, under certain conditions of temperature and air pressure.

Standards of Comparison.—The specific gravity of solids and liquids is governed by and obtained by comparing them with, distilled water at certain degrees of temperature. Unfortunately the degrees of temperature selected and in use in different countries vary.

In this country distilled water at 39° F. is taken as the basis for solids and liquids. Hydrogen gas is used for measuring the specific gravity of gases.

Manner of Ascertaining Specific Gravity of Solids and Liquids.—To ascertain the specific gravity of a substance in solid or liquid form, divide its weight in air by the weight of its bulk of distilled water at 39° F.

The pharmacist is rarely called upon to take the specific gravity of a solid substance; in most cases it is impractical with the utensils usually at his command; he therefore refers to specific gravity tables. It is, however, quite necessary that he have apparatus and be able to determine the specific gravity of liquids, such as glycerine, syrups, acids, alcoholic liquors, urine, etc.

Apparatus for Ascertaining Specific Gravity.—

The graduated specific gravity tube, the specific gravity bottle and the hydrometer are sufficient for the druggists' use in this direction.

Practical Use of Specific Gravity.—To know the specific gravity is necessary in some cases, in order to determine the commercial or potential value, especially in the case of alcoholic liquors, acids, etc.

Procedure.—Take the specific gravity bottle made to hold 1,000 units, say 100 Ccm (or 1,000 Cmm); it will contain 1,000 decigrammes of distilled water at 39° F.; first take the tare of the specific gravity bottle, then exactly fill it with the specimen, cork it so as to exclude all air bubbles, wipe the exterior surface perfectly dry and clean; weigh bottle and contents carefully, then divide its weight by the weight of an equal bulk of water; the result is the specific gravity.

Example.—Take the bottle and fill with glycerine U. S. P., prepare and weigh as above, the weight will be 1250 decigrammes or 125 grammes; 1250 divided by 1000 = 1.250 the specific gravity.

Hydrometers are self-explanatory, but must be separately graduated for the respective substances for which they are used.

In valuing alcohol, refer to the tables in the Pharmacopœia; the percentage by weight and volume of alcohol of any specific gravity, can be seen at a glance at these tables.

A list of some of the most important articles used in dispensing, with their specific gravities, respectively, is here given for reference.

TABLE GIVING THE SPECIFIC GRAVITIES
OF OFFICIAL SUBSTANCES ARRANGED
IN THE ORDER OF THEIR DENSITIES.

Official Name.	Specific Gravity.
Benzinum.....	0.670—0.675
Æther.....	0.750
Alcohol Absolutum.....	0.797
Spiritus Ammoniaë.....	0.810
Alcohol Deodoratum.....	0.816
Alcohol.....	0.820
Petrolatum Molle (60° C.—140° F.).....	0.820—0.840
Petrolatum Spissum (60° C.—140° F.).....	0.820—0.840
Spiritus Glonoini.....	0.825
Spiritus Ætheris Nitrosi.....	0.836—0.842
Oleum Aurantii Corticis.....	0.850
Oleum Erigerontis.....	0.850
Oleum Juniperi.....	0.850—0.890
Oleum Terebinthinae Rectificatum.....	0.855—0.865
Oleum Terebinthinae.....	0.855—0.870
Oleum Limonis.....	0.858—0.859
Terebenum.....	0.862
Oleum Rosæ.....	0.865—0.880
Amyl Nitris.....	0.870—0.880
Oleum Coriandri.....	0.870—0.885
Oleum Myristicæ.....	0.870—0.900
Oleum Aurantii Florum.....	0.875—0.890
Petrolatum Liquidum.....	0.875—0.945

Official Name.	Specific Gravity.
Oleum Bergamottæ.....	0.880—0.885
Oleum Lavandulæ Florum.....	0.885—0.897
Oleum Copaibæ.....	0.890—0.910
Æther Aceticus.....	0.893—0.895
Oleum Rosmarini.....	0.895—0.915
Acidum Oleicum.....	0.900
Oleum Menthæ Piperitæ.....	0.900—0.920
Oleum Thymi.....	0.900—0.930
Aqua Ammonia Fortior.....	0.901
Spiritus Ammonia Aromaticus.....	0.905
Oleum Æthereum	0.910
Oleum Adipis.....	0.910—0.920
Oleum Sabinæ.....	0.910—0.940
Oleum Amygdalæ Expressum.....	0.915—0.920
Oleum Olivæ.....	0.915—0.918
Oleum Eucalypti.....	0.915—0.925
Spiritus Frumenti.....	0.917—0.930
Oleum Sesami.....	0.919—0.923
Oleum Cubebæ	0.920
Oleum Morrhua.....	0.920—0.925
Oleum Gossypii Seminis.....	0.920—0.930
Oleum Cajuputi.....	0.922—0.929
Spiritus Vini Gallici.....	0.925—0.941
Eucalyptol	0.930
Oleum Lini.....	0.930—0.940
Oleum Hedeomæ.....	0.930—0.940
Oleum Menthæ Viridis.....	0.930—0.940
Adeps	0.932
Alcohol Dilutum.....	0.936
Acidum Sulphuricum Aromaticum....	0.939
Oleum Tiglii.....	0.940—0.960
Copaibæ.....	0.940—0.990
Cetaceum	0.945
Oleum Ricini.....	0.950—0.970
Cera Flava.....	0.955—0.967

Official Name.	Specific Gravity.
Tinctura Ferri Chloridi.....	0.960
Aqua Ammoniaë.....	0.960
Oleum Foeniculi.....	0.960
Cera Alba.....	0.965—0.957
Oleum Picis Liquidæ.....	0.970
Oleum Chenopodii.....	0.970
Oleum Santali.....	0.970—0.978
Oleum Theobromatis.....	0.970—0.980
Oleum Myrciæ.....	0.975—0.990
Oleum Anisi.....	0.980—0.990
Vinum Rubrum.....	0.989—1.010
Oleum Cadinum.....	0.990
Vinum Album.....	0.990—1.010
Camphora.....	0.995
Aqua Hydrogenii Dioxidii.....	1.006—1.012
Acidum Aceticum Dilutum.....	1.008
Fel Bovis.....	1.018—1.028
Oleum Sinapis Volatile.....	1.018—1.029
Acidum Sulphurosum.....	1.035
Liquor Potassæ.....	1.036
Oleum Pimentæ.....	1.045—1.055
Acidum Hypophosphorosum Dilutum..	1.046
Acidum Aceticum.....	1.048
Liquor Ferri Nitratis.....	1.050
Acidum Hydrochloricum Dilutum....	1.050
Liquor Sodæ Chloratæ.....	1.052
Oleum Cinnamomi.....	1.055—1.065
Acidum Phosphoricum Dilutum.....	1.057
Acidum Nitricum Dilutum.....	1.057
Acidum Aceticum Glaciale.....	1.056
Liquor Sodæ.....	1.059
Oleum Caryophylli.....	1.060—1.067
Oleum Amygdalæ Amarae.....	1.060—1.070
Thymol.....	1.069
Creosotum.....	1.070

Official Name.	Specific Gravity.
Acidum Sulphuricum Dilutum.....	1.070
Oleum Sassafras	1.070—1.090
Acidum Hydrobromicum Dilutum....	1.077
Mel (diluted with two parts of water)	1.100
Balsamum Peruvianum.....	1.135—1.150
Liquor Ferri Acetatis.....	1.160
Acidum Hydrochloricum.....	1.163
Oleum Gaultheriæ.....	1.175—1.185
Methyl Salicylas.....	1.183—1.185
Liquor Plumbi Subacetatis.....	1.195
Acidum Lacticum.....	1.213
Cambogia	1.221
Glycerinum.....	1.250
Liquor Ferri Citratis.....	1.250
Carbonei Disulphidum.....	1.268—1.269
Liquor Sodii Silicatis.....	1.300—1.400
Syrupus Acidi Hydriodici.....	1.313
Syrupus	1.317
Liquor Ferri Tersulphatis.....	1.320
Syrupus Ferri Iodidi.....	1.353
Mel	1.375
Liquor Ferri Chloridi.....	1.387
Acidum Nitricum.....	1.414
Chloroformum	1.490
Liquor Zinci Chloridi.....	1.535
Liquor Ferri Subsulphatis.....	1.550
Chloral (at melting point 58° C. 136.4° F.).....	1.575
Acidum Phosphoricum.....	1.710
Phosphorus	1.830
Acidum Sulphuricum.....	1.835
Iodoformum	2.000
Liquor Hydrargyri Nitratis	2.100
Bromum.....	2.990
Iodum	4.948
Hydrargyrum.....	13.5584

PART II.

PRESCRIPTIONS.

The Prescription Department.—We will leave the general arrangement of the prescription case to the individual idea of each pharmacist, as there is no uniformity of opinion on the matter; we mention a few points which may contribute to convenience and accuracy in compounding. A separate closet should be attached to the case for very powerful and poisonous drugs, and the pharmacist should avoid keeping two drugs with similar names in close proximity to each other.

The most important feature of the prescription case is the prescription scale.

All prescription departments should be furnished with at least two pairs of prescription scales, one to be kept for weighing small quantities (never over twenty grains), and the other for larger quantities up to the ounce.

By keeping a scale for small quantities, its delicacy will be retained for a very much longer time than if used for all weights.

In too many pharmacies can be seen prescription scales that will not turn for a quarter of a grain; this is due to dull bearing points, too large a weight

having been used on some occasion, or to rust or dirt being allowed to collect on them.

The prescription scale should be cleaned with water, and if care is exercised nothing else is needed.

They should always be enclosed in a case, protected from the air and dust. Always see that your scales balance before attempting to weigh.

It is well to place pieces of paper of even weight on the pans, for by this means you avoid the danger of soiling the latter, and the substance weighed can be at once carried to where you wish to deposit it.

Keep the case door closed when the scale is not in use; put away the weights after using them, and when handling weights, use a little pair of nippers, as perspiration from the fingers in time corrodes the metal weights.

Utensils.—The compounding of prescriptions, recipes and formulas, requires the use of certain utensils or tools.

To be able to compound any and all prescriptions, quite a variety of such utensils is necessary. Every drug store should have a balance, plenty of graduates of all sizes, spatulas of steel and horn, mortars and pestles of different shapes for pills, mixtures and emulsions, glass stirring rods, tiles, a pill cutter, pill rounder, an apparatus for sealing cachets, a suppository machine (desirable but not indispensable), porcelain capsules, Florence flasks, a chemical thermometer, sand bath, water bath, Bunsen burner or spirit lamp, funnels, filtering paper, litmus paper, infusion mug, casserole, specific gravity bottle, hydrometer, test tubes and a graduated burette.

Individual wants should be considered in selecting the balance, care being taken to get one that is not defective; it should gravitate to $\frac{1}{84}$ of a grain

and should not be used for large amounts, else it will soon wear out.

Select good graduates, those perfectly graduated and properly annealed, as well.

Care of Utensils.—Each and every article should have a specific place, so that when needed it can be found without delay. When used each article should be properly and perfectly cleaned and returned to its place.

To cleanse vessels of adhering resinous tinctures, essential oils, etc., first scrub with plenty of soap and powdered pumice, with a little water; then, if necessary, use a little alcohol, but remember it is expensive; elbow exercise is cheaper. When collodion has been measured and before the ether has evaporated pour the vessel full of water when a film is precipitated on the surface of the vessel, the film contracts so that it can be removed without any inconvenience.

For cleaning graduates, mortars, tiles and spatulas of oils, ointments, etc., first scrub with plenty of sawdust, removing all the grease possible, after which use soap, pumice and water; sometimes benzine is necessary; it is best used on a cloth. To remove iodine use ammonia water.

All utensils should be perfectly dried after being washed. A minim graduate might be required before having time to dry and the adhering water would make a difference in the amount so measured. A wet graduate attracts and holds dust and grit which might chance to get into an eye water, or hypodermic solution, and do a great deal of harm.

Books of Reference.—In compounding prescriptions it often becomes necessary to refer to books for information. This should not embarrass the

beginner and does not embarrass the experienced pharmacist. Be quick, however, to find what you want, and don't use the book in the presence of the patron, as he will likely think you lack competency and lose confidence in you.

Every druggist should possess a library, the more extended the better, but a Pharmacopœia, Dispensatory, Medical Dictionary, a good work on Pharmacy, one on Materia Medica and one on Chemistry are absolutely indispensable to a first class drug store.

The prescription counter should by all means be as systematic in its general arrangement as possible; the drugs should be in alphabetical arrangement. A special compartment should contain the most poisonous drugs; further than this the requirements and convenience of each individual store should be the guide.

THE PRESCRIPTION.

Definition.—A prescription is construed to mean a formula. In the sense that the pharmacist uses the term, we will define it as: An order of a physician on a pharmacist, for a remedy to be used for the relief, prevention or cure of pain or disease.

The word is derived from the Latin word *præscriptio*, meaning I write before (*præ*, before and *scriptio*, I write).

Nomenclature.—Prescriptions are usually written in Latin, for various reasons. The most important of these reasons are:

First; Latin is the language of science the world over; it being a dead or unspoken language, is not subject to change by the addition of new words and phrases, and changes in spelling, like the modern languages.

Second; It is generally necessary, and always well to conceal the identity of the remedies or medicines from the family; the use of Latin accomplishes this practically; as the language, especially the part used in a prescription is understood by comparatively few.

Third; Latin names are distinctive and exact; some drugs have various common names, and some names are used for more than one drug. Again, the vernacular name of a drug, and especially vegetable drugs, may be one thing in English and a different

thing in German, French or Swedish, etc. The use of Latin at once obviates all these difficulties, saving one the trouble of learning the names in all the different languages.

"Humulus" is the Latin name for hops; anywhere in the world if "Humulus" appears on a prescription it is known at once that "strobiles of Humulus lupulus, *Linne*," is the article wanted; thus it is seen that "Humulus" is the universal scientific name for the drug. The English name is hops; French, houblon; German, hopfen; Swedish, humlekottar; Danish, humle.

By using the Latin name the necessity of learning the vernacular, or common name, in all the different tongues is avoided.

Fourth; It affords brevity.

Signs Used.—The signs and symbols are the Metric and Troy, for weights and measures, and various abbreviations and Latin phrases sometimes used in writing either the directions, or some notations in regard to the prescription concerning only the compounder. In a chapter following this is a list which includes most all such signs or abbreviations, together with their meaning.

Analysis.—For the purpose of study, a prescription may be considered to consist of various parts, viz.:

PRESCRIPTION.	{	1. Superscription.	{ Consisting of a symbol, <i>R</i> , an abbreviation for the imperative verb, <i>receipe</i> , meaning <i>take thou</i> . In French prescriptions <i>Pr.</i> or <i>P.</i> is used and stands for <i>Prenez</i> .
		2. Inscription.	{ Basis. Adjuvant. Corrective. Excipient or diluent.
		3. Subscription.	{ The directions to the compounder.
		4. Signature.	—Directions to the patient.
		5. Prescriber's name and the date.	

The following is an example of a theoretical prescription:

Superscription — <i>R</i> .	
Inscription.	Morphinæ Sulphatis... <i>Grs. iv. Basis.</i>
	Tincturæ Aconiti..... <i>ʒi Adjuvant.</i>
	Syrupus Rhei..... <i>ʒii Corrective.</i>
	Aquæ Anisi Q. S..... <i>ʒiv Vehicle.</i>

Subscription.—*Misce secundum artem.*

Signature.—*A teaspoonful every three hours.*

Date and name. 4-7-'95. T. B. GRAY, M. D.

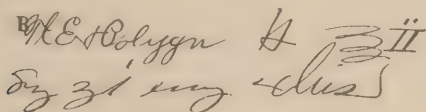
The above prescription was written for facial neuralgia. The adjuvant (tr. aconite) assists the basis, morphine, by decreasing heart action. The syrup of rhubarb acts as the corrective by overcoming the

constipating effect of the basis, and the anise water serves as the vehicle in which the rest are administered.

A prescription may, however, contain the basis alone, or the basis with the adjuvant, or the basis with a simple vehicle or diluent. A single ingredient may serve a double or treble office, as in the case of some compound syrup or tincture. Again the basis may need no aid in doing its work, or corrective of its action, nor any special vehicle for its administration. On the other hand there is no limit to the number of ingredients which may be used, provided there is something to be accomplished by each, and also provided there is no chemical or physiological incompatibility between them.

In every day practice a great many prescriptions are written, some of the terms in which require abbreviating. The abbreviations are not objectionable unless ambiguous terms are used.

The tendency is to too much brevity, or to call the correct name, carelessness; take the following prescription for an example:

A handwritten prescription in cursive script. The first line reads "R. Ext. Polygoni f 3 j." and the second line reads "Sig. 3i every 4 hrs." The handwriting is fluid and characteristic of a medical professional from the late 19th or early 20th century.

What was wanted was:

Fl. Ext. Polygonum Hydropiper f 3 j.

Sig; f 3 j every four hours.

Again the following is often seen: "Liq. Pep.," which might mean liquid pepsin, liquor pepsin or possibly something else.

There are a great many terms, similar to the above, which may chance sometimes to confuse the dispenser; below is a list of some of those most commonly met with. This list could be extended considerably, but embraces a sufficient number for use here.

ABBREVIATIONS THAT ARE IN- COMPLETE AND LIABLE TO MORE THAN ONE INTERPRETATION.

Acid. Hydroc.	May mean Acidum Hydrochloricum or Acidum Hydrocyanicum.
Aconit.....	Aconitine, Aconiti Radix, Aconiti Folia.
Ammon.....	Ammonia (alkali), Ammoniac (gum resin).
Aq. Chlor.....	Aqua Chlori, Aqua Chloroformi.
Aq. Fontis.....	May often be read Aqua Fortis.
Calc. Chlor.....	Calcium Chloride, Chlorinated Lime.
Chlor	Chlorine, Chloroform, Chloral.
Emp. Lyt.....	Emp. Lytharg (lead plaster), old name Emp. Lyttæ (blistering plaster).
Ext. Col.....	Extractum Colchici, Extractum Colocynthidis.
Hyd. Chlor....	Corrosive Sublimate, Chloral Hydrate.
Hydr.....	Hydrargyrum (mercury), Hydras (hydrate) Hydriodas (hydriodate), Hydrochloras (hydrochlorate).
Hydr. Perox...	Hydrogen Peroxide, Hydrargyri Peroxidum.
Mist. Ammon...	Ammonia mixture, Mixture of Ammoniac (gum resin).
Potass. Hyd....	Potassium Hydrate (caustic potash), Potassium Hydriodate (iodide of potassium).
Sod. Hypo.....	Sodium Hyposulphite, Sodium Hypophosphite.
Sod. Sulph.....	Sodium Sulphate, Sodium Sulphite, Sodium Sulphide.
Sulph.....	Sulphur, Sulphide, Sulphate, Sulphite.
Zinci. Phosph.	Zinc Phosphate, Zinc Phosphide.

The knowledge of Latin is a great help to the student in pharmacy, as well as to the dispenser; it is, however, not absolutely necessary. The great majority of druggists know nothing of Latin whatever, but they learn abstractly the Latin names of all the drugs and also the uses and meaning of certain Latin terms and phrases used in writing prescriptions.

The following is, as far as it goes, a

CORRECT LIST OF LATIN PHRASES AND ABBREVIATIONS USED IN WRITING PRESCRIPTIONS.

Phrase or Word.	Abbreviation.	Meaning.
A, aa.....		Of each.
Abdomen	Abdom	The belly.
Absente febre.....	Abs. febr.....	In the absence of fever.
Accurate		Accurately.
Ad	Ad	To, up to.
Ad duas vices.....	Ad 2 vic.....	At twice taking.
Ad secundum vicem.....		To the second time.
Ad tertiam vicem.....		For three times.
Adde, or addantur, addendus, addendo.	Ad. or add.....	Add, or let them be added, to be added by adding.
Ad gratam acidita- tem	Ad grat. acid.....	To an agreeable sourness.
Adhibendus.....		To be administered.
Adjacens	Adjan.....	Adjacent.
Ad libitum.....	Ad lib.....	At pleasure.
Ad move, admove- atur, admoveantur.....		Apply, let it be applied, let them be applied.
Adstante febre.....	Adst. febre.....	When the fever is on.
Adversum	Adv.....	Against.
Aggrediente febre...	Aggred. febre.....	While the fever is coming on.
Agitato vase.....		The vial being shaken.

Phrase or Word.	Abbreviation.	Meaning.
Aliquot.....		Some.
Alter.....		The other.
Alternis horis.....		Every other hour.
Amplus.....		Large.
Ana.....	A., aa.....	Of each.
Aqua.....	Aq.....	Water.
Aqua astricta.....	Aq. astr.....	Frozen water.
Aqua bulliens.....	Aq. bull.....	Boiling water.
Aqua communis.....	Aq. comm.....	Common water.
Aqua fervens.....	Aq. ferv.....	Hot water.
Aqua fontalis or fontis or fonta.....	Aq. font.....	Spring water.
Aqua marina.....	Aq. mar.....	Sea water.
Aqua pluvialis or pluvialis.....	Aq. pluv.....	Rain water.
Aut.....		Or.
Balneum arenæ.....	B. A.....	Sand bath.
Balneum maris or maris.....	B. M.....	A salt water bath.
Balneum vaporosum or vaporis.....	B. V.....	A vapor bath.
Balsamum.....	Bals.....	Balsam.
Barbadensis.....	B. B., B. B. S.....	Barbadoes.
Bene.....		Well.
Bibe.....	Bib.....	Drink.
Bis.....		Twice.
Bis in die.....	Bis in d.....	Twice a day.
Bis in dies.....	Bis in d.....	Twice a day.
Bolus.....	Bol.....	A large pill.
Bulliat, bulliant.....	Bull.....	Let boil.
Butyrum.....	But.....	Butter.
Cæruleus.....	Cærul.....	Blue.
Calefactus.....		Warmed.
Calomel.....	Cal.....	Mild chloride of mercury.
Calomelas.....		Calomel or mild chloride of mercury.
Capiat.....	Cap.....	Let him (or her) take.
Caute.....		Cautiously.
Charta.....	Chart.....	Paper.
Chartula.....		Small paper.
Cibus.....		Food.
Cochlear, or cochleare cochleatim.....	Coch, Cochleat.....	A spoonful, by spoonfuls.

Phrase or Word.	Abbreviation.	Meaning.
Cochlear amplum...	Coch. amp.....	A tablespoonful.
Cochlear magnum...	Coch. mag.....	A large spoonful (about $\frac{1}{2}$ an ounce.)
Cochlear medium, or modicum.....	Coch. med.....	A dessert spoonful (about 2 fluidrachms.)
Cochlear parvum...	Coch. parv.....	A teaspoonful (about 1 fluidrachm.)
Coctio.....	Coct.....	Boiling.
Cola.....	Col.....	Strain.
Colaturæ.....	Colatur.....	To, or of, the strained liquor.
Colatus.....	Colat.....	Strained.
Coletur.....	Colet.....	Let it be strained.
Colentur.....	Colent.....	Let them be strained.
Collutorium.....	Collut.....	A mouth wash.
Collyrium	Collyr., Coll.....	An eye wash.
Coloretur.....		Let it be colored.
Compositus.....	Comp.....	Compounded.
Concisus.....		Cut.
Confectio.....	Conf.....	Confection.
Congius	Cong.....	A gallon.
Conserva.....	Cons	A conserve; also keep (thou).
Continuantur rem- edia.	Cont. rem.....	Let the medicines be continued.
Contusus		Bruised.
Coque, coquantur...	Coq	Boil, let them be boiled.
Coque secundum artem	Coq. S. A.....	Boil according to art.
Cor, cordis		The heart.
Cortex.....	Cort.....	The bark.
Coxa		The hip.
Cras, crastinus.....	Crast.....	To-morrow.
Cras mane sumendus.....		To be taken to-mor- row morning.
Cras nocte.....		To-morrow night.
Cras vespere.....		To-morrow evening.
Crastinus.....		For to-morrow early.
Cum	C.....	With.
Da, detur	D., det.....	Give, let be given.
De.....		Of or from.
Debita spissitudo...	Deb. spiss.....	A proper consis- tency.

Phrase or Word.	Abbreviation.	Meaning.
Debitus .....	.....	Due, proper.
Decanta	Dec.....	Pour off.
Decem, decimus .....	.....	Ten, the tenth.
Decoctum	Decoct.	A decoction.
Decubitus.....	Decub.	Lying down.
De die in diem.....	De d. in d.....	From day to day.
Dentur tales doses		
No. IV.....	D. t. d. No. IV.....	Let 4 such doses be given.
Detur in duplo .....	.....	Let twice as much be given.
Dexter, Dextra.....	.....	The right.
Diebus alternis.....	Dieb. alt.....	Every other day.
Diebus tertiis.....	Dieb. tert.....	Every third day.
Dilue, Dilutus.....	Dil.....	Dilute (thou), diluted.
Dimidius.....	Dim.	One half.
Directione propria.....	D. P. or direc. prop.....	With a proper direction.
Divindatur in partes		
æquales.....	D. in p. aeq.....	Let it be divided into equal parts.
Dividendus, -a, -um.....	.....	To be divided.
Dolor .....	.....	Pain.
Donec .....	.....	Until.
Dosis	D.	A dose.
Durante dolore.....	.....	While the pain lasts.
Eadem (fem).....	.....	The same.
Ejusdem	EjUSD.....	The same.
Electuarium.....	Elect	An electuary.
Emesis .....	.....	Vomiting.
Enema.....	En.....	An enema, a clyster.
Enemata .....	.....	Clyster.
Et.....	.....	And.
Extende	Ext.....	Spread.
Extende super alu-		
tam mollem.....	Ex. sup. alt. moll....	Spread thou upon soft leather.
Extractum	Ext	An extract.
Fac, Fiat, Fiant.....	F., Ft	Make, let it be made, let them be made.
Fac pilulas duode-		
cim.....	F. pil Xlj.....	Make 12 pills.
Farina.....	.....	Flour.

Phrase or Word.	Abbreviation.	Meaning.
Febre durante.....	Feb. dur.....	During the fever.
Febris		Fever.
Fervens.....	Ferv	Boiling.
Fiat cataplasma....	Ft. cataplasa.....	Make a poultice.
Fiat ceratum.....	Ft. Cerat.....	Make a cerate.
Filtra.....		Filter (thou).
Filtram, Filtrum.....		A filter.
Fluidus	Fl.....	Liquid.
Formula		A prescription.
Frustillatim	Frust	In little pieces.
Fuerit.....		Shall have been.
Gargarisma	Garg.....	A gargle.
Gradatim.....		By degr'es, grad'ally.
Grana sex pondere.....		Six grains by weight.
Granum.....		Grain, grains.
Gratus.....		Pleasant.
Gutta.....	Gtt	A drop.
Guttæ.....	Gtt	Drops.
Guttatim	Guttat	By drops.
Guttis quibusdam...	Gutt. quibusd.....	With a few drops.
Hustus.....	Haust.....	A draught.
Hebdomida		A week.
Herba		An herb.
Hæri.....		Yesterday.
Hic, Hæc, Hoc.....		This.
Hirudo		A leech.
Hora.....	H.....	An hour.
Hora somni.....	H. S. or Hor. som...	Just before going to sleep.
Hora undecima matuna.....		At the eleventh hour of the morning.
Hora decubitus.....	H. D.....	At the hour of going to bed.
Horis intermediis...	Hor. interm.....	In the intermediate hours.
Idem		The same.
Idoneus.....		The proper.
Imprimis.....		First.
Incide, Incisus.....	Inc	Cut (thou), being cut.
Indies.....	Ind.....	From day to day, daily.
Infunde.....	Inf	Pour in.
Infusum	Infus.....	An infusion.

Phrase or Word.	Abbreviation,	Meaning.
Injectio.....		An injection.
Injectiatur.....		Let a clyster be given.
In plumento		In gruel.
Instar		As big as.
Inter.....		Between.
Internus.....		Inner.
Jam.....		Now.
Jentaculum.....	Jent.....	Breakfast.
Julepus, Julepum...	Jul.....	A julep.
Jusculum.....		A broth.
Juxta		Near to.
Kali præparatum, potassæ carbonas. Kal. ppt.....		Prepared kali, or carbonate or bicarbonate of potash.
Lac		Milk.
Lana.....		Flannel.
Linimentum.....	Liniment.....	A liniment.
Linteam		Lint.
Liquor	Liq.....	A solution.
Lotio		A lotion.
Macera	Mac	Macerate.
Magnus.....	Mag	Large.
Mane. Mane primo.....		In the morning, very early in the morning.
Manus		The hand.
Massa, massa pilularis		Amass, a pill mass.
Medius		Middle.
Mensura		By measure,
Mica panis.....	Mic. pan.....	Crumb of bread.
Minimum.....	M. or min	A minim.
Minutum.....		A minute.
Misce	M	Mix.
Mistura	Mist.....	A mixture.
Mitte, mittatur, mittantur.....		Send, let it be sent, let them be sent.
Modo præscripto... Mod. Præsc.....		In the manner prescribed.
Mora		Delay.

Phrase or Word.	Abbreviation.	Meaning.
More dictu.....	More dic	In the manner directed.
More solito.....	More sol.....	In the usual manner.
Mortarium.....		A mortar.
Ne tradas sine nummo	Ne tr. s. num.....	Do not deliver it unless paid.
Nisi.....		Unless.
Non.....		Not.
Nox, noctis.....		Night.
Nucha		The nape of the neck.
Numerus.....	No.....	Number.
Nux Moschata.....		A nutmeg.
Octarius.....	O	A pint.
Octavus		Eighth.
Octo		Eight.
Oleum lini sineigne.....		Cold-drawn linseed oil.
Oleum olivæ optimum.....	O. O. O.....	Best olive oil.
Omni hora, omni bihorio, omni quadrante horæ.....	Omn. hor., Omn. bih. Omn. quadr. hor....	Every hour, every two hours, every quarter of an hour.
Omni mane.....		Every morning.
Omni nocte.....		Every night.
Opus.....		Need, occasion.
Ovum		An egg.
Pannus.....		A rag.
Pars, partis.....		A part.
Partes æquales.....	P. æ.....	Equal parts.
Partitis vicibus.....	Part. vic.....	In divided doses.
Parvulus		An infant.
Coch. parvulum.....	Coch. parv.....	A teaspoonful.
Parvus		Little.
Pastillus, Pastillum.....		A little ball of paste, to take like a lozenge, etc.
Pediluvium.....		A foot bath.
Per.....		Through, by.

Phrase or Word.	Abbreviation.	Meaning.
Peracta operatio em- etici		When the operation of the emetic is finished.
Perdeliquium.....		By deliquescence.
Pergo, pergere.....		To go on with.
Phiala prius agitata. P. P. A.....		The bottle having been first shaken.
Pilula		A Pill.
Poculum pocillum...Pocul., pocill.....		A cup, a little cup.
Pondere	P	By weight.
Ponduscivile		Civil weight (avoir- dupois weight.)
Pondus medicinale.....		Medicinal (apothecaries' weight.)
Pone aurem.....		Behind the ear.
Post singulus sedes, liquidus		After every loose stool.
Potus		Drink.
Præparata		Prepared.
Prandium	Prand.....	Dinner.
Primo mane.....		Very early in the morning.
Primus.....		The first.
Pro		For.
Pro ratione ætatis.....		According to the age of the patient.
Pro re nata.....	P. r. n.	Occasionally.
Pugillus.....	Pug.....	A pinch, a grip be- tween the thumb and first two fin- gers.
Pulvis, pulverizatus. Pulv		A powder, powdered.
Pyxis		A pill box.
Quantum libet, or Quantum placet. or Quantum vis, or Quantum volueris. Q. l., Q. p. Q. v.....		As much as you please.
Quantum sufficiat, or Quantum satis....	Q. S.....	As much as is suffi- cient.
Quaqua hora		Each hour.

Phrase or Word.	Abbreviation.	Meaning.
Quaque	Q. Q.	Each or every.
Quartus		Fourth.
Quater		Four times.
Quatuor		Four.
Quibus		From which.
Quinque		Five.
Quintus		The fifth.
Quoque	Q. Q.	Also.
Quorum	Quor.	Of which.
Quotidie		Daily.
Ratio		Proportion.
Recens	Rec.	Fresh.
Recipe	R.	Take.
Redactus in pulver-		
em, redigatur in		
pulverem	Red. in pulv., redig.	
	in pulv.	Let it be reduced to powder.
Regio umbilici		The umbilical region.
Reliquus		Remaining.
Repetatur, repetan-		
tur	Rept.	Let it be repeated, let them be repeated.
Respondere		To answer.
Retinere		To keep.
Saltem		At least.
Scatula	Scat.	A box.
Scilicet		Namely.
Secundum artem, se-		
cundum naturam.	S. A., S. N.	According to art, according to nature.
Secundus		Second.
Sedes		The alvine evacuation.
Semel		Once.
Semis	Ss.	A half.
Semidrachma	Semidr.	Half a drachm.
Semihora	Semih.	Half an hour.
Septem		Seven.
Septimana		A week.
Sescuncia		An ounce and a half.
Sesquihora		An hour and a half.
Sex		Six.

Phrase or Word.	Abbreviation.	Meaning.
Sextus		Sixth.
Si.....		If.
Sic, Sic?.....		So, is it so?
Signa	Sig.	Mark thou.
Signetur nomine proprio		Let it be written upon with the proper name (not with the trade name).
Simul		Together.
Sine		Without.
Singulorum	Sing.	Of each.
Si non valeat.....	Si n. val.	If it does not answer.
Si opus sit.....	Si. op. sit.	If necessary.
Si vires permittant.....	Si ver. perm.	If the strength will bear it.
Sit		Let it be.
Solus		Alone.
Solve		Dissolve.
Solvo, solve, solution.....		To dissolve, dissolved.
Somnus.....		Sleep.
Spiritus vini rectificatus		Rectified spirit of wine.
Spiritus vini tenuis.....		Proof spirit.
Spiritus vinosus.....		Ardent spirit of any strength.
Statim.....	Stat.	Immediately.
Stet, Stent.....	St.	Let it stand, let them stand.
Stratum super stratum.....	S. S. S.	Layer upon layer.
Subactus.....		Subdued.
Sub finem coctionis.....		When the boiling is nearly finished.
Subinde.....		Frequently.
Sumat talem.....		Let the patient take one like this.
Sume, sumat, sumatur, sumantur, sumendus.....	Sum.	Take (thou), let him take, let it be taken, let them be taken, to be taken.

Phrase or Word.	Abbreviation.	Meaning.
Summitates.....		The summits of tops.
Superbibendo haus- tum.....		Drinking afterwards this draught.
Supra.....		Above.
Tabella (dim. of tab- ula, a table.).....	Tabel.....	A lozenge.
Talis.....		Such, like this.
Tempori dextro.....		To the right temple.
Tempus temporis.....		Time or temple.
Ter.....		Three times.
Ter in die, or terdie	T. i. d., or T. d.....	Three times a day.
Tere.....	Tre.....	Rub.
Tero.....		I rub.
Tertius.....		Third.
Tinctura.....	Tinct.....	Tincture.
Tres.....		Three.
Triduum.....		Three days.
Tritura.....	Trit.....	Triturate.
Trochisci.....	Troch.....	Lozenges.
Tussis.....		A cough.
Ultimo (or Ultima) præscriptus.....	Ult. præsc.....	The last ordered.
Una.....		Together.
Uncia.....		An ounce.
Ut dictum.....	Ut dic.....	As directed.
Utendum.....	Utend.....	To be used.
Uto uti.....		To make use of.
Vas vitreum.....		A glass vessel.
Vehiculum.....		A vehicle.
Vel.....		Or.
Venæsectio brachii.....		Bleeding in the arm.
Vesper, vespers.....	Vesp.....	The evening.
Vices.....		Turns.
Vires.....		Strength.
Vitellus.....		Yolk.
Vitello ovi solutus.....		Dissolved in the white of an egg.
Vitreum, vitrum.....		Glass.
Vomitone urgente..	Vom. urg.....	The vomiting being troublesome.

NUMERALS.

CARDINALS.

Unus.....	One.
Duo.....	Two.
Tres.....	Three.
Quatuor.....	Four.
Quinque.....	Five.
Sex.....	Six.
Septem.....	Seven.
Octo.....	Eight.
Novem.....	Nine.
Decem.....	Ten.
Undecim.....	Eleven.
Duodecim.....	Twelve.
Tredecim.....	Thirteen.
Quatuordecim ..	Fourteen.
Quindecim	Fifteen.
Sexdecim.....	Sixteen.
Septemdecim ..	Seventeen.
Octodecim or duo de viginti	Eighteen.
Novemdecim or un de viginti.	Nineteen.
Viginti.....	Twenty.
Viginti unus or unus et viginti	Twenty-one.
Triginta.....	Thirty.
Quadraginta ..	Forty.
Quinquaginta ..	Fifty.
Sexaginta	Sixty.
Septuaginta ...	Seventy.
Octoginta.....	Eighty.
Nonaginta	Ninety.
Centum	One hundred.

ORDINALS.

Primus.	First.
Secundus.....	Second.
Tertius.....	Third.
Quartus.....	Fourth.
Quintus.....	Fifth.
Sextus.....	Sixth.
Septimus.....	Seventh.
Octavus.....	Eighth.
Nonus.....	Ninth.
Decimus.....	Tenth.
Undecimus....	Eleventh.
Duodecim.....	Twelfth.
Tertius decimus	Thirteenth.
Quartus decim's	Fourteenth.
Quintus decim's	Fifteenth.
Sextus decimus.	Sixteenth.
Septimus deci- mus.....	Seventeenth.
Octavus deci- mus.....	Eighteenth.
Nonus decimus.	Nineteenth.
Vicesimus.....	Twentieth.
Vicesimus pri- mus.....	Twenty-first.
Tricesimus....	Thirtieth.
Quadragesimus	Fortieth.
Quinquagesim's	Fiftieth.
Sexagesimus...	Sixtieth.
Septuagesimus.	Seventieth.
Octogesimus...	Eightieth.
Nonegesimus ..	Ninetieth.
Centesimus	Hundredth.

Prescription Writing. --The first thing necessary is that the physician be provided with suitable writing materials.

It is most advisable that he provide *himself* with proper prescription blanks giving his name, residence and office hours, also space for a number, date and the patient's name. If he prefers writing his prescriptions in the metric system, the blanks should by all means have the decimal line. The foregoing precautions are of great assistance :

1st. In assisting the patient or pharmacist in locating the writer.

2d. Encourages putting the patient's name upon the prescription, which so often prevents mistakes in delivering as well as in administering the medicine.

3d. By having good, roomy blanks the necessity for crowding and abbreviating is obviated.

4th. The decimal line takes the place of the decimal point, which is so liable to be misplaced or omitted altogether, as often happens, or of an accidental dot or fly speck on the paper altering the quantity.

5th. By providing spaces for a number and date, you greatly assist the pharmacist in filing away and retaining the prescription for future reference or re-filling, if desired.

In writing prescriptions the physician should take particular pains to write plainly, that the pharmacist may have no trouble in understanding his wishes and directions as expressed therein. This is one of the most important matters connected with the writ-

ing of prescriptions, but unfortunately physicians as a rule do not seem to realize that upon the legibility of the prescription depends to the greatest extent its chances of being properly compounded. Each article should be designated by its full Latin name and in the genitive case, unless only a certain number of an ingredient is to be specified, when it should be in the accusative. Whenever abbreviations *are* used great care should be taken to make them as full as possible and to write *plainly*. If it is desired that the prescription should not be refilled it should be so stated on the prescription, as it is customary with pharmacists to refill them as often as requested, unless otherwise directed by the physician. When an unusually large dose of any particular drug is written for, the quantity should be underlined thus, Strychninæ Sulphatis Gr. i, or some other mark attached, to show the pharmacist that such was really intended. This saves much anxiety to the careful pharmacist and occasionally saves delay occasioned by seeking the writer to see if an overdose has not been ordered.

Whenever possible the physician should make the patient understand that the prescription is merely his directions to the pharmacist to prepare certain medicine, and is then to remain in the hands of the pharmacist (or words to this effect might be printed upon the prescription blank). This not only leaves the prescription where it belongs for future reference and mutual protection of writer and dispenser but would to a great extent settle the long discussed question as to whom the prescription belongs, and prevent its being hawked about among the friends, of the patient, doing incalculable damage by being used in cases for which it was never intended. A copy of the prescription could be furnished the

patient upon the order of the physician, where it is necessary, as in the case of transient patients or travelers.

In writing extempore prescriptions it is a good plan to first write patient's name and then the names of each ingredient, afterwards you decide the number of doses to be ordered and calculate the quantity of each ingredient from that number. When the same amount of two consecutive substances is ordered the quantity is omitted after the first one, and "āā" is placed after the second. This means that the quantity following it applies to both of the preceding ingredients. We might say in conclusion that physicians should aim to render their mixtures as pleasant to the taste, smell and sight as possible, for these details go a great way toward the success of practitioners.

Receiving the Prescription.—When the patron presents a prescription to be dispensed, accept it with courtesy, invite the patron to be seated and if possible tell him the time required before the prescription can be finished; the person may have errands or other business to do, and possibly may not be able to wait the required time.

Where it is customary, a willingness to deliver the medicine should always be shown. When you make a promise to have a prescription ready or delivered at any specified time, by all means do so; there is no such disappointment as waiting over time for medicine which the patient's condition requires. Having received a prescription from a customer, the first duty of the pharmacist is to see that the patient's name is attached to it. Many pharmacists, upon receiving a prescription, give the customer a numbered check, a duplicate of which is attached to the

prescription and subsequently to the package after the medicine has been prepared, and serves to identify it when delivered to the customer. The writer does not consider this a very good method, knowing of several cases in which it has failed in its purpose through the checks being left on the counter by the customer, or being otherwise exchanged. A much better plan is to see that the patient's name is upon the prescription, and when the medicine is prepared place the name upon the outside wrapper as well as upon the label; this serves to identify it thoroughly when delivered. Some pharmacists advocate the use of prescription cases, which leave the prescription clerk and his manipulations in full view of the customers, with the view, no doubt, of making an impression upon the public by his neatness and dexterity. But there are many serious objections to this, first of which is that customers could not be kept from questioning and otherwise interrupting him; then if a prescription happens to require a little thoughtful consideration before beginning manipulations, the customer is very liable to jump at the conclusion that you are unable to read it or that there is something wrong with the prescription. Many other objections could be offered, but we consider that the two mentioned above are sufficient.

After receiving the prescription from the customer and seeing that the patient's name is attached to it, the pharmacist should proceed to his prescription case at once. I would strongly advise against the perusal of the prescription in the presence of the customer, as this is quite liable to provoke such questions as, what is in it? or, what is that prescription for? These are questions a pharmacist should avoid the necessity of answering by all means pos-

sible, as the pharmacist has no right to tell the customer the character or medicinal effect of the medicines called for by the prescription. If, however, such questions cannot be parried it is best to state frankly that professional etiquette forbids you to discuss the subject. The next step is to read very carefully the entire prescription to see that you are perfectly familiar with all its details, at the same time satisfying yourself that there is no overdose of any ingredient, and deciding upon the order in which the ingredients are to be mixed.

Make sure that all the required ingredients are in stock. Next select the utensils to be used, and the container, which if it be a bottle, should be fitted with a cork, to save having one or more corks to put back with particles of medicine adhering to them. The ingredients are then carefully weighed or measured and mixed in the order and manner deemed most proper.

Some system of checking should be used to prevent the occurrence of errors; there are many systems in use, such as checking and rechecking by another clerk; this sounds well but sometimes there is no other clerk to check; mistakes sometimes happen even when the most theoretical methods are practiced; a good old way is to attend strictly to what you are doing and do only one thing at a time; mistakes generally occur from absentmindedness, seldom when anyone has in his mind the thought that he is liable to make a mistake, which may destroy his reputation, his employer's business or possibly the patient's life *and all three*. The dispensing counter imposes grave responsibilities, they should not be lightly assumed by the aspiring young drug clerk.

Very little can be written to assist the beginner in

learning to read prescriptions, as his ability to master this branch of the profession depends almost entirely upon his general knowledge of drugs and his actual experience in handling physicians' prescriptions. Therefore the beginner should make it a constant practice to read and thoroughly master every prescription filled in the store each day; this can be done during his hours for study, and is about the only way to gain proficiency.

In reading a prescription, if the name of an ingredient is somewhat obscure or doubtful, one is often assisted in determining it by referring to the quantity ordered, the other ingredients, or the form in which the medicine is to be prepared; either of these will sometimes suggest what the obscure item is, though they more often have no bearing on the matter. If it is the quantity of an ingredient you are in doubt of, it can often be decided by considering the dose of the ingredient. For instance, where one is at a loss to decide whether a character is intended for a drachm or an ounce sign.

Whenever you are not perfectly familiar with any article in the prescription refer freely to your dispensatory or other works of reference. The pharmacist who considers himself so competent that this is never necessary is a dangerous man, and young men too often fail to avail themselves of this help through false modesty or fear of being thought incompetent.

If more than one prescription is presented at one time by a customer, learn if all are for the same patient, if not, put names on each label; serious accidents have happened by neglect of this point.

The label on a prescription should have the druggist's name and place of business, the physician's name, the number, the patient's name, the date and

the directions, which should be written distinctly, avoiding all attempts at flourishing or fancy writing.

Refilling Prescriptions.—In this country it is customary to refill prescriptions on presentation of the container or serial number, whether presented by the party for whom it was written, or by some other person; prescriptions for poisons and abortifacient drugs are excepted, however, for refilling those would be direct violation of the criminal laws; but even in some cases of this kind prescriptions are refilled.

Of course there are different opinions on the subject of refilling prescriptions.

We maintain that a prescription is written for a patient, to be used for a certain ailment, under certain conditions, and that the patient is not qualified to diagnose his own case, and hence is not able to decide what he needs, or whether he needs anything at all.

In our opinion a physician's prescription should be treated as a voucher or bank check — paid, cancelled, and filed away for reference — and not refilled at all; if needed again another order could be written, but generally changes are advisable if not necessary. Custom, however, has rendered the practice of such a plan impossible.

When copies are asked for by the patient they should be freely given; the druggist has a legal right to the original; in cases of error, copies are not legal evidence, originals are.

Neither original nor copy should be given to anyone except the original owner. Nobody should be permitted to look over the prescription file; the medicine often discloses the disease or affectation of the patient. It might sometimes be very embarrassing to the patient to have outside parties, or

even members of the family, know his troubles, especially as they have no right to such knowledge.

In France the exposure of the prescription for the wife to the husband has been made grounds for damages (and judgment obtained) as well as criminal proceedings, which resulted in the druggist being severely fined.

Keep your prescription file in a private place where there will be no temptation; be careful about giving copies to outsiders and avoid such a position.

Reading the Prescription.—Carelessness is one of the shortcomings of mankind in general, of physicians in particular, *some* physicians at least; errors from oversight and haste of the busy physician are numerous, and, coming usually in their prescriptions where inadmissible are always perplexing; the pharmacist is compelled by moral duty and statute law to correct such errors. He must always be on the lookout for discrepancies in the writing also. The reading of prescriptions is one of the extempore duties of the druggist, which demands more than ordinary attention and care. Ability in this line cannot be attained except by constant practice, and depends principally on peculiar adeptness in reading all kinds of penmanship, and also on a general knowledge of drugs and their remedial doses.

Experience or practice in this line is most valuable when had in a drug store in the down-town or business part of a large city, because a greater variety of prescriptions are to be seen from a greater number of physicians, while the advantage of transient trade is in favor of the "down-town" store.

Travelers from foreign countries often take copies of prescriptions, sometimes going from place to

place and having medicine compounded as needed; if this fact be borne in mind, it will illustrate the advantage of using Latin in prescription writing.

Physicians should write on specially prepared blanks; the custom of the pharmacist furnishing such, gratis to the physician, is passing slowly but surely out of use.

The propriety of such a custom is of course a question only in some cases; there is no harm in it if not abused.

Physicians should allow their prescriptions to go to any drug store patronized by the patient, unless good reasons exist for objection.

Drug stores should be so conducted that no physician can have just reasons for boycotting one nor drumming for another. Of course the physician's good will and influence are to be desired, but if you resort to any but a strictly honorable and professional course, your competitor goes you one better, and you must see his bid or lose the stake.

Some physicians are petted, and abuse the favors thus obtained from the druggist.

A person's own conscience will enable him to judge the proper course in each individual case.

Fac-similie Illustrations.—

The following are a few prescriptions taken from every day business; many more and much worse specimens could be given but for lack of space. The study of these illustrations may serve to give the chance reader an idea of the lack of perfection usually observed, and the great variety of shortcomings one must contend with to be a prescription clerk. As before stated only natural adaptability and actual experience will enable one to be successful in this line.

Sometimes there is no such thing as reading the scrawls intended to be a prescription; only when familiar with the hieroglyphics of the author, is the druggist safe, and able to divine the meaning—the following illustrates this statement:

℞
Catall.
Wampoles.
1 tablespoonful
before meals.

Prescription No. 0:

Ol. M(orrhuae, Mist.) Wampoles ℥vj.

S. Tablespoonful before meals.

Was this ℞ written so that the patient would need go to one particular store? Only the doctor knows.

R

Ext. Ergot. 10

Tr: capsule 30.

Take two at bedtime
every night

Prescription No. 1 is an example of a correctly written prescription, by the metric system; it was written about 10 years ago by one of the most prominent physicians (now deceased) of Chicago, in his day; it was compounded by the writer for the doctor's own use. Comment is unnecessary; we might, however, say that if one of the *busiest* physicians can find time to write his orders clearly, and carefully, some who have time to spare, could employ it to good advantage in this direction, and at the same time assist the druggist, who often finds it very embarrassing, as well as a great inconvenience, to spend ten or twenty minutes deciphering hieroglyphics.

<i>℞</i>	<i>gm. cc</i>
<i>Strych. Sulph</i>	<i>06</i>
<i>Liq. Acide Arsenicos</i>	<i>2 60</i>
<i>Sr. Ferri Chloridi.</i>	<i>6</i>
<i>Acide Hydrochlor.</i>	<i>6</i>
<i>Glycerum.</i>	<i>30</i>
<i>Syr. Simp. q.s ad</i>	<i>120</i>
<i>Mixt = Take a teaspoonful in</i>	
<i>Water (3) three times daily.</i>	

No. 2 also, shows care, neatness, and ability to write a prescription that is correct in every way, as easily as to be careless and slovenly; it is a fair sample of the great number written during many years of practice by this physician; he prefers to use the metric system.

Morphia Sulph — gr $\frac{1}{2}$
 Aconite Sulph — gr $\frac{1}{40}$
 Coca — gr $\frac{1}{2}$
 M. Sed. Sulph. m. iii
 Newburgh

No. 3 is written plainly enough as far as penmanship is concerned; however, the third or last ingredient is obscure, and, plainly an error due to thoughtlessness of the prescriber; "Coca" is the leaves of the plant Erythroxylon; what was wanted was "Butyrum Cacao" or more properly written Oleum Theobromatis. In this case the pharmacist was perfectly justified in dispensing what was wanted, instead of refusing to dispense or embarrassing the doctor by going to him with the prescription.

R

Decoct semin lini

vi

Aq lauroceras

dr semis

Muriat morph

grj

Syrup simpl

uncj

M. Tablespoonful

every 2 hours.

No. 4 Is written in Latin and is plain enough.
It directs:

R Decoction of flaxseed, ounces, six.

Water of cherry laurel, drachm, one-half.

Muriate of morphine, grain, one,

Syrup Simple, ounce, one.

Mix. Write: Tablespoonful every two hours.

R^d Potass. Sesquicarb 3ss
 Hydrastia Mur. gr. xv
 Tannic acid gr. v
 Morph Sulph gr. j
 Aq. ros 3iv
 Berberine Hydrochlorate as directed

No. 5 calls for:

Potassii Sesqui-carbonatis.....	3 ss.
Hydrastia Muriate.....	gr. xv.
Tannic Acid.....	gr. v.
Morph. Sulph.....	gr. j.
Aqua rosæ.....	3 iv.

M. et Sig. External use as directed.

The second article mentioned was intended for Berberine Hydrochlorate, but as this article was in trade under the wrong name when the above prescription was written, the prescription was correct.

R Lima sulphates 92.ij
 dig. hydrastine 3iij ss
 Lestrine — 3iij ss
 Acid carbol cr 92.ij
 Aquae ad — 3iij
 Lique Symplicia Mf.
 Use three Each Day

No. 6 is not difficult to read but the second ingredient might be a stumbling block, as only the doctor's own druggist friend knows the formula; what was wanted was an aqueous saturated solution of the resinoid Hydrastin, an article which enjoyed quite a reputation among Eclectic practitioners some time ago and is used yet to some extent.

R

Mist Formel

No XIV Zi

Sig- Zi t. d.

Magma

4

ills

No. 7 illustrates the practice of prescribing by private formulas; prescriptions written thus tend to go the rounds and back to the druggist who is "next" to the prescriber; this method, to say the least, is not commendable.

This R calls for three ounces of a mixture made by formula 14; directions, teaspoonful three times a day in water; the "i" being understood in the above abbreviation for "t. i. d." meaning three times daily.

Tint. Ferri Chloridi 3v
 Potassii Chloratis 3j
 Tint. Belladonæ gtt. v.
 Glycerinum 3ss
 Syr. Glycyrrhizæ 3jss
 Aqua Cinnamomi ad q. s. 3iv
 M. et Sig. Give a teaspoonful in
 water every four hours

No. 8 is written negligently, the prescriber's time being limited: there is also a slight incompatibility, viz.: Tr. Ferri Chloridi, with Syr. Glycyrrh. In full the prescription reads:

R. Tint. Ferri Chloridi	3 v.
Potassii Chloratis	3j
Tint. Belladonæ	gtt. v.
Glycerinum	ss.
Syr. Glycyrrhizæ	jss.
Aqua Cinnamomi ad q. s.	3 iv.

M. et Sig. Give a teaspoonful in water every four hours.

R

Kal. jodatis 30, 00
Aqua fontis 100, 00
Syrup. Sarsaparillæ
70, 00
D. S. Teaspoonful twice
daily
7/14/0

No. 9 written hastily, but the experienced drug-
gist has no difficulty in reading it.

	Grammes.
R. Kalium Jodatum.....	30.00
Aqua fontis.....	100.00
Syrup Sarsaparillæ.....	70.00
D. S. Teaspoonful twice daily.	

R

Potass. Bromidi. $\overline{3ij}$
 Aqua. $\overline{3ii}$
 M. et Sig. $\overline{4 \frac{1}{2}}$
 Water every 4 $\frac{1}{2}$
 1806 \overline{B}

No. 10 reads:

R Potassii bromidi..... 3 ij.

Aqua..... $\overline{3ii}$.

M. et Signa: A teaspoonful in water every four hours.

R

Bismuthi nitr. $\frac{ij}{\text{ss}}$
 Dyspepsyn $\frac{ij}{\text{ss}}$
 Fiat chart No. XII
 Sig. One after eating
 L 18064

No 11 reads:

R Bismuth subnitrate.....3ij.
 Dyspepsyn.....3i.
 M. Fiat chart No. 12.
 Sig. One after eating.

In Digitalis $\frac{3}{4}$ ^{ss}
 Spt. Ammonia $\frac{1}{2}$
 M. i. q. s. to 20
 M. i. q. s. to 20

No. 12 calls for two drachms tincture digitalis
 and half an ounce aromatic spirit of ammonia to be
 mixed, and directs to administer fifteen drops in
 water every half hour to two hours. This physician
 can, but has not the time to write better. This is a
 fair example of his efforts at penmanship.

Bismuth subnitrate 3m 1057
62
~~Guaiacol Carb~~ — grs
 Misture Cretae 3 ii
 3i every 2 hrs

No. 13. One might be at a loss to know what preparation of bismuth is wanted—compare with the balance of the prescription and it is plain that the subnitrate was intended. The second article mentioned is Guaiacol Carbonate, one of the legion of the imported new remedies from Germany, some of which are good; the great number are however more successful at catching U. S. dollars than curing diseases; they are mostly prescribed by physicians unacquainted with Materia Medica.

R

Nitrat of Potash ZVI

Give a Tea Spoon
in $\frac{1}{2}$ Pail of Water
twice a day

No. 14 is a good prescription—when given to a horse, for which it was intended. "Nitrate" was intended by the eminent "Vet." who wrote the above.

R Calvanti
 curbu perum
 pepu f perao
 Agem distalle *3/1*
 Tunt carlos *3/111*
 auorub
 My am teap *3/*
3 lura
 a lara

No 15 This prescription was written by a German physician. It shows some of the terms commonly used where there is a German population; it reads:

℞	Extractum Cortex peruviana regia fri-	
	gida præparata	3iv.
	Aqua distillata.....	3iij.
	Tinctura Cortex Auranti (Amara) ..	3j.

M. S. One teaspoonful three times a day.

The first article is extract of red cinchona prepared by the frigid or cold process, and is an article of the Pharm. Germanica.

R

Liquor anodynus
Hoffman

Tinct opii
crocata

Liquor cornu cervi
succin

M 1 One teaspoon
at a time

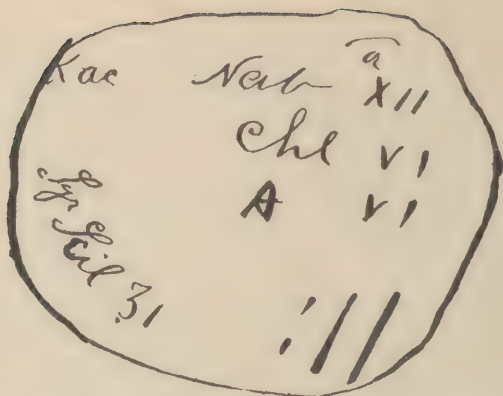
No. 16 This prescription was written by the author of the preceding one. It reads as follows:

R Liquor Anodynus (Hoffman's).. \bar{z} i.
Tincturæ Opium Crocata..... gtt. xx.
Liquor Cornu Cervidæ Succinati \bar{z} ss.

M. D. S. One teaspoonful at a time.

These articles are seldom called for or found, except in city stores and "Deutsche Apoteken." The second article is a 12 per cent tincture of opium; the third, a solution of succinate of ammonia prepared from horns of the deer.

R



No. 17 This gem was published April 21, 1892, in the *Pharmaceutical Record*. It is a reproduction of a prescription written by a physician of Buffalo, N. Y. It was presented at a pharmacy in New York City to be filled. The druggist deciphered but did not dispense it. Of course there is no *reading* to be done, but it is sometimes necessary to guess. This will cultivate one's ability in that line. The druggist, favored by the prescriber's "plugging," could not tell what was intended. The author however explained it as follows:

K ac = Kalium acetate	} āā... gr. xij.
Na b = Natrium bromide	
Chl = Chloral	} āā..... gr. vj.
A = Antipyrine	

In a two-ounce solution in water.

The syr. scil. 3j. was an afterthought, and was intended for, "add this to the above mixture," which had been previously dispensed.

18/3888

Alum. pow: gr XII

Aq. dest: 3 \overline{v} β

Glycerini 3 β

Cocaine gr \overline{v}

Uss. for Inhalation

No. 18 calls for powdered alum and cocaine, to be dissolved in a mixture of one-half ounce glycerine and 5½ ounces of water. Cocaine (alkaloid) is soluble in 700 parts water; part here would remain undissolved. If attempt is made to dissolve by heat, double decomposition follows, complicated reactions take place, white oily globules settle to the bottom, while a flocculent precipitate of aluminum hydrate remains suspended in or floats on the surface of the liquid. The solution should be filtered. "16 to 1" the prescriber meant to write for hydrochlorate of cocaine, but he did not, and a druggist should not take the liberty of changing a prescription unless permitted by the physician.

And Ricoll 3/
 Sant Corbalt 1/
 Elyon 571.
 Regent 1/11, 1/11, 1/11
 W. Lang 1/11
 1/11

No. 19 by author of 22, 23, 37, and 48, is a fair specimen of his writing used in every day prescribing; he can, however, do much better; why he don't can only be guessed.

R Sodii Bicarbonatis..... 3i.
 Acidi Carbolici gtt. v.
 Glycerini..... ʒii.
 Aqua Mentha piperitæ, q. s. ʒiii.
 M. S. Teaspoonful before meals.

Murdock's
 Liquid Food ~~St. V~~
 1 hour, (2)
 Longman
 Wm. Longman & Co.
 15, Ave. M. N. Y.

No. 20.

R Murdock's Liquid Food \bar{z} iv.

S. Two teaspoonfuls before meals.

In dispensing such prescriptions always remove the wrapper and label, then label the same as any

other prescription, though it is advisable to use the original bottle. When less than an original bottle of a patent medicine is called for, it is best to charge for full bottle, except in some cases where the article is in common demand and use.

R Morph. mur. gr. viii
 Aq. L. ceras. ℞
 M. et. Sig. Take 10 Drops in the
 morning & 15 Drops in the
 evening.

No. 21 is written plainly enough, the abbreviation, though, is *too brief*; the ounce symbol, however, makes up for the deficiency of effort.

R Morphina Murias. gr. viii.
 Aqua Lauro-Cerasi. fl. ℥ j.

M. et. Sig. Take ten drops in the morning and fifteen drops in the evening.

Such prescriptions should never, under any considerations, be refilled without the doctor's order. We know of scores of people who have acquired the morphine habit by the abuse of prescriptions like it. The dose in this case is nearly maximum for an adult.

R Syrup cortex aurant 3v,
 Res. carch 3i;
 Aqua menthan Piperit 3iv
 Acid citri q. sat ad
 Saturat (q. 5,)
 Kali. Carbonat 3iss
 actus 2 ueser. 3iss
 Liquor Bismuthi 3iiss
 Aqua lauro ceru 3i;
 on f-m L. Allen $1\frac{1}{2}$ - 2 theke
 mer fast Caffeel und Zinapfe

No. 22 This prescription, written by a German physician, with directions in German, is a model in every way, except the penmanship, which is poor; any druggist would soon be able to read it, however.

R Syrup Cortex Aurantii..... 3vj.
 Kalii Carbonatis 3j.
 Aqua Menthæ Piperitæ..... 3iv.
 Acidi Citrici q. s.
 Satis ad Saturat.....
 Kalii Bromidi..... 3iss.
 Ætheris (Sulphuric)..... 3iss.
 Liquor Bismuthi 3iiss.
 Aqua Lauro-Cerasi..... 3j.

This is intended as an anodyne and sedative, just enough citric acid is wanted to saturate the carbonate of potash, forming neutral potassium citrate, which will serve the purpose of a corrective, being slightly diaphoretic and refrigerant.

R Kalii Bromati..... ℥i
Aqua destillata..... ℥iv
Acetate Morphine..... gr. i.
M. et s.
Chicago, 8/15'90.

R/ *Liq fern pepton.* 5.00
 * *Sinch Menth. pp.* 10.00
Extr. Coca 0.50
Int Rhei. aquos. 10.00
Ds 3 mal bigle / 20^h ppe
 For

Ami Mu
Repair
Equal parts Lig
x

No. 24 is a copy of a prescription, the original being kept by the patient. He was evidently suffering from some trouble of the digestive organs, his condition requiring iron in a delicate and easily assimilable form. Solutions of peptonate of iron at that time (July, 1887) had been on the market only a short time. The clerk into whose hands the prescription found its way, not having heard of the new preparation, and having just graduated from one of the "oldest colleges in the west," decided that as the amount was only 5 Cc. it was too insignificant an item to bother about, so he promptly and with dignity (sic.) *substituted* an extemporaneous preparation of his own formula, making proper notation across the left hand margin of the prescription.

What would a careful physician say if he chanced to learn of such conduct on the part of the druggist? It was a crime without the slightest palliating cir-

cumstances. The customer and also the clerk quit the store, but neither the physician nor the proprietor ever learned of the incident, which shows the utter lack of conscience as well as the dense ignorance of the clerk.

72 Acetate of Potash 35
 72 L. Belladonna 35
 4pts Ether - 35
 105 Kit 35
 Common Turpentine 35
 1/2 oz every two hours
 Baker

99503
 100

No. 25. Would a pharmacist be justified in dispensing this prescription? Yes; it was prescribed for a horse, the dose is not excessive.

R

Tr. Nuc. vomitor

3i

Tr. Rhei 3iii

Tr. Cinch. Co. ad. 3i

S. 3ss every 4 hours
in water

Signature

No. 26 Is read:

- R Tr. Nuc. Vom..... 3i.
Tr. Rhei 3iii.
Tr. Cinch. Co. ad..... 3i.
M. S. 3ss every four hours in water.

R

MTT

Exch. art.

Cotton root seed

Exch. art. Ergot.

Eschsch. lign.

7907a

58xv

3 times
daily 3 times

Prescription No. 27 was written by a very intelligent physician but he seems to have been suffering

from absentmindedness when he wrote for cotton root seed, and signified the dose as three tablespoonfuls three times a day. However the pharmacist will have no trouble in interpreting his intention as follows: Extract of cotton root bark, two oz. extract of ergot, half an oz. and sufficient fluid extract of licorice to make four oz. The directions should be three times daily a tablespoonful. The error in the directions is the more serious, from the fact that the pharmacist could not always see that such was not intended.

R To Linc 3i
 Cly pur 3i
 M.S.A.
 Sig. As direct
 A.M.

Prescription No. 28 is one that requires particular manipulation in compounding, in order to secure a thorough admixture of the ingredients. The tincture of guaiac should be placed in a dry mortar and by adding the water, a few drops at a time, with constant trituration, a perfect solution is retained.

29
 Infus: fol. digitalis.
 (F) 3v
 Ammon. ammoniat. 3ij.
 Spirit. æther. nitrosi 3ij.
 Tinct. scillæ. grs
 Syr. sennæ
 — Morph. 3ij.
 Misce 3 horas /
 1/2, 1/2, 1/2

Prescription No. 29 shows very poor writing and abbreviating; it is generally read as follows:

R Infusi (foliorum?) digitalis..... 3v.
 Ammonii chloridi (depuratum) ..
 Spiritus ætheris nitrosi..... aa3ij.
 Antimonii tartratis..... gr. j.
 Syr. Scillæ.....
 Syrupi morphinæ..... aa3ss.
 Misce.....

Sig. One teaspoonful every three hours.

However, many pharmacists contend that the fifth ingredient is syrup of senna, instead of syrup of squills. Unfortunately, we were unable to consult the writer.

~~R~~
 Strych Sal $\frac{v}{i}$
 Sodā Arseni .. $\frac{ii}{i}$
 Potas Carb $\frac{ʒii}{i}$
 Hydrag Buhl $\frac{ʒi}{i}$
 Chlor Simpla $\frac{ʒss}{i}$
 M. S. Teaspoonful after meals.

Prescription No. 30 is easily read in spite of the poor writing, but the pharmacist will see at a glance that the prescription is incompatible.

The sodium arseniate would be converted into potassium arseniate with the simultaneous formation of sodium carbonate. A second portion of the potassium carbonate abstracts from the strychnine salt its sulphuric acid, leaving the much less soluble strychnine alkaloid. Finally the mercuric chloride is decomposed by the potassium carbonate to give rise to mercuric oxide.

The medicine when prepared would be a six ounce mixture, containing potassium arseniate, pure strychnine alkaloid, oxide of mercury, and a reduced amount of potassium carbonate.

As this obviously is not the doctor's intention, he should be consulted and shown the incompatibility of the prescription.

R
 c n z
 l n z
 m n z
 a b c
 n. o

Number 31 would appear at first glance to be a Chinese prescription, but it is written in short-hand for the purpose of compelling the patient to take it to a certain pharmacist who has added that system to his many accomplishments. Such prescriptions are rarely met with, and the pharmacist could not be expected to read them. This one calls for one drachm each of sulphate of quinine and aromatic sulphuric acid and sufficient simple elixir to make four ounces. The directions are a teaspoonful three times a day.

R

Tinct Opii Crocata
Tinct Kermes 3 II
Syr Rh Arum 3 I
ad 3 II
Sig. A teaspoonful every
2 hours

Prescription No. 32 proves a stumbling block to many from the fact that the first ingredient Tinct. Opii Crocata is from the German Pharmacopœia, and seldom used in this country. It is a 12 per cent. tincture of opium.

~~_____~~
~~_____~~
~~_____~~
Iodine
1 teaspoonful
before meals

Prescription No. 33 is another very poorly written one and calls for three ounces of Iodia and directs it to be given, a teaspoonful before meals.

R
L. B. A. S. — 3, +
Sig. Five drops three times a day.

Prescription No. 34 was written by the same physician as No. 38 and shows that he could write plainly if he would. This one is easily read as follows: Liquor potas. arsen., one ounce; Sig. Five drops three times a day. One might be at a loss to decide whether one or two ounces is called for in the above prescription. But considering the small dose one is prepossessed in favor of the opinion that the second vertical line is an elongation of the one dot above the horizontal line over the j. Such proved to be the case.

Prescription No. 35 is so poorly written that it is impossible to decide with any degree of certainty what some of the ingredients are, and as the writer

is deceased they will remain uncertainties. Almost every pharmacist to whom it has been submitted differs in the interpretation. The following is the most general translation:

℞ Chloralis.....two drachms
Potassii bromidi.....three "
Extracti valerianæ fluidi.....half an ounce
Tincture gentianæ.....two drachms
Syrupi Simp.....one ounce
Aquæ. q. s. ad.....six ounces
Misce et fiat solutio.

Signa. One tablespoonful at night.

No pharmacist would be justified in attempting to fill such a prescription without consulting the doctor, for his interpretation could be nothing more than guess work. If the writer cannot be seen the best plan is to refuse to fill the prescription.

R

ps.
Chin. sulph.
gr. XXV
Spirit ferment. ℥ii
Elixir herb.
8/88 sand. ℥ii
T.S. A tablespoon
every 2 hours.

Prescription No. 36 shows an entirely different style of penmanship and is very easily read.

Rl. over
 3i
 S. nit. Rl
 3i
 Est. Rl
 3i
 S. mix. g
 3i
 F. & VI
 Ali. Rl
 3i

Prescription No. 37 is another in which some of the ingredients can only be surmised. We will leave its translation to the reader.

R

Rad Rhu 3B.
 Fol Senna 3I
 Q. Bull add q.s. mft
 Infusum 3III adda
 Tinctura Natronatums.
 Ext. Licoricia 3I
 Sig. Sij. 3II
 3II 3III
 3II 3III

Prescription No. 38 calls for half an ounce of rhubarb root, one ounce of senna leaves, with sufficient boiling water to make three ounces of infusion in which one ounce of rochelle salts and two drachms of extract of licorice are to be dissolved. The directions are one teaspoonful every three hours.

R
 Copab ʒi ss
 Liquid Ext
 And Licorice aa *℥*
 Aqua *℥*ss ʒm
 It Emulsion
 Sig Lspnd 3 tday
P.C.

Prescription No. 39 should be prepared as follows:
 Place in a dry mortar six drachms of powdered
 gum arabic and as much of extract of licorice, thor-
 oughly dry, and pour on the balsam of copaiba. Mix
 well, and add at one time twelve drachms of cam-
 phor water. Continue the stirring with the pestle
 till the mixture is thoroughly homogeneous, scraping
 now and then the side of the mortar and the pestle,
 so that no balsam can escape emulsion. Now add
 more camphor water by small portions at a time,
 and finally complete the three fluid ounces as pre-
 scribed.

D
 X
 Cal Reman gr $\times \times \times$
 R \times fil
 gr / my
 1/4 row

Prescription No. 40 calls for thirty grains of per-
 manganate of potassium to be made into ten pills.
 The directions are one every four hours. For mak-
 ing these pills kaolin ointment is recommended.
 This is made from equal parts of petrolatum, paraffin
 and kaolin; the first two constituents being melted
 together, then kaolin added and stirred in until cool.
 It is said to be the only pill-mass which has been
 successfully used with potassium permanganate.

R Ergotin Gr viii
Qlem New DS
in fl Sup No viii
sig One as directed

Prescription No. 41 calls for eight grains of ergo-
 tine and a sufficient quantity of a cacao butter to
 make eight suppositories.

R^xps.

Chmi. Sulfh. gr ℥

Chmt. Sulfh. gr ℥

Mft Tal dos. No
XXX

Capsules.

One 3 times a day after
meals as directed.

Prescription No. 42 is very well written, and would give no trouble provided one is acquainted with the two Latin words, "tales doses," meaning of such doses. In this prescription the quantities of the ingredients for one dose are given and the pharmacist instructed to make thirty such doses and put them in capsules.

Prescription No. 43
One drachm of salicylate of cinchonidia
to be made into twenty capsules.
The directions are, one four times daily.

Prescription No. 43 is written in the ordinary hand of a physician, who often does much better than this. One drachm of salicylate of cinchonidia is ordered to be made into twenty capsules. The directions are, one four times daily.

℞ Ferri Phos gr xx
Quini Sul .. xii
Strych Sul .. ss
Acid Phos Conc q. s.
M. et ft. pil. No. xv
Sig. — 3 times a day

Prescription No. 44 would probably give some trouble in reading it, to those unacquainted with the doctor's style. It is translated as follows:

Ferri. Phosph.....	gr. xx.
Quinine Sul.....	gr. xii
Strych. Sul.....	gr. ss.
Acid Phos. Conc.....	q. s.
M. et ft. pil.....	No. XV.

Sig. One three times a day.

The strychnine should be finely powdered and carefully triturated with the phosphate of iron until they are thoroughly mixed. The quinine may now be added and the whole again well triturated. The mass is made with syrupy phosphoric acid, and as it acts as a powerful solvent it must be used with caution, about eighteen or twenty drops being usually sufficient.

(50) *Euonymin* gr. xxxv
Juglandin gr. xlv
Leptandrin gr. xl
Podophyllin gr. $\frac{ii}{j}$
Oli Menth. Pip. gtt. xx
Pulv. Cardamom. sem.
Pulv. anisi sem. ā ā gr. x
Ext. Hyoscyam. q. s.
Ft. capsules no. l.

No. 45 Is a combination of favorite eclectic remedies. It reads as follows:

R. *Euonymin* gr. xxxv.
Juglandin gr. xlv.
Leptandrin gr. xl.
Podophyllin gr. $\frac{ii}{j}$.
Ol. menthæ pip. gtt. xx.
Pulv. Anisi semen } ā ā gr. x.
Pulv. Cardamomi semen }
Ext. Hyoscyami q. s.
 (Misce) *Ft. Capsul.* No. L.

The fault with the above prescription is with the last item. *Ext. Hyoscyamus* is too potent a drug to prescribe or dispense so indiscriminately.

Omissions.—Very often physicians omit to specify the quantity of one or more of the ingredients in a prescription, or the number of powders, pills, etc., into which it is to be divided. In such cases there is only one course to pursue, viz., see the doctor and have the omissions rectified.

Overdoses.—When a doubt arises as to an apparent overdose of some dangerous drug in a prescription, the pharmacist must use good judgment and quick decision, bearing in mind that his first duty is to protect the patient and next to protect himself and the physician, and that a physician's mistake does not excuse a pharmacist before the law. The first point is to gain time without exciting suspicion in the mind of the customer. This can be done by informing him that it will be some time before the medicine is prepared, and offer to deliver it or request him to call for it at a specified time. After thus disposing of the customer see the writer of the prescription and satisfy yourself as to whether or not it should be dispensed as written. If the physician cannot be found at the time and you consider it necessary to dispense the medicine, either for the good of the patient or to protect the physician, do so by reducing the dose of the dangerous ingredient to a safe limit and notify the physician at the earliest possible moment, and any honorable physician will appreciate your precaution. It sometimes happens that even after such cases have been brought to the notice of the doctor he will insist that the dose is all right. In such cases if the pharmacist still thinks it an overdose he should refuse to dispense it and if he has reason to consider the doctor ignorant and incompetent it becomes his duty to inform the customer his reasons for such refusal, though precaution and judgment should be exercised.

PART III.

TOXICOLOGY.

General Remarks.—The responsibilities which are attached to the profession are manifested in the reading and dispensing of difficult and doubtful prescriptions, plainly and sometimes severely.

The competent pharmacist must be not only a man of mature judgment, capable of quickly deciding the best thing to be done under more or less obscure circumstances, but be able to inspire confidence on the part of a patron in what he says; he must, to be able to guard against over-doses, be thoroughly posted on Posology or the principles and rules of dosage. He must also have considerable knowledge of Toxicology or the subject of poisons, and their antidotes and also be able to tell in some cases the symptoms manifested by particular poisons so that he may be able to decide what to do and what antidote to give. This is one of the main subjects or branches of the Medical Science to be sure, but is quite important to the pharmacist also, because he is often called upon when a physician cannot be had for hours.

After taking a fatal dose of poison there is no time to be lost; the druggist is always called upon, being stationary.

If he is not able to do something to save or relieve the sufferer, he is always blamed, usually in a severe measure.

The following treatise on the subject of dosage and Toxicology, while condensed, will be found quite thorough enough for the practical pharmacist; the more thoroughly it is mastered, the better will be the chances of the one who learns it to discharge the very responsible duties devolving on him, when brought in contact with emergency cases of poisoning by whatever agent or cause.

DOSAGE IN GENERAL.

There are numerous conditions which modify the action of drugs, which must be taken into consideration.

I. Disease often fortifies the system against the action of drugs. In peritonitis and cerebro-spinal fever very large doses of opium are taken with benefit, then again severe pain or delirium tremens greatly retards the production of sleep by opium; spinal disease interferes greatly with purgation; in typhoid fever there is a wonderful tolerance to alcohol. Nevertheless, considering the system capable of tolerating large doses of certain drugs, under certain conditions, never give the drug in such doses as would cause death in health.

II. Habit and Mode of Life have a marked influence on the blood, either causing plethora or anæmia, and they also ward off the action of certain drugs.

If a man becomes accustomed to the use of certain narcotics, such as opium or alcohol, they will lose to some degree their power of action.

Thus the opium eater only obtains quietude and ease by taking a dose sufficiently large to kill an ordinary person.

Again, a person who is hardened to exposure and work in the open air requires a much larger dose to affect the system than those who lead a sedentary life.

III. Idiosyncrasy.—This is important, but cannot be foreseen. A patient should always be asked about his peculiarities in regard to taking drugs. Some are affected by the tonic influences of even minute doses of arsenic, some are salivated by a minute dose of a mercurial, some are poisoned by a very small amount of turpentine. Others cannot take quinine, opium, belladonna nor the iodides, and with still others dilute solutions of cocaine applied to the mucous membranes will cause severe toxic symptoms. These idiosyncrasies are innumerable and should always be kept in mind.

IV. Sex.—Men as a rule bear larger doses of medicines than women. Of course in women during pregnancy or at the menstrual period strong drugs should be avoided.

V. Age.—Children and old people are more easily affected by most drugs, especially the narcotics, than adults in the prime of life, but they bear larger doses of purgatives in proportion. The following rules for dosage, with relation to age can be used:

(a) Dr. Young's is probably the best and most generally useful; it is: add 12 to the age and divide the age by the result. Thus a child of three years $\frac{3}{3+12} = \frac{3}{15} = \frac{1}{5}$ of that of the adult. At the age of twenty-one years the full dose is given.

(b) Dr. Cowling's rule is: divide the patient's next birthday by 24; thus at three years the dose would be $\frac{4}{24}$ or $\frac{1}{6}$ of that of the adult, five years, $\frac{6}{24}$ or $\frac{1}{4}$; 11 years, $\frac{12}{24}$ or $\frac{1}{2}$, etc.

(c) Prof. Clarke has proposed a rule that is based on relative weights. Taking the average weight of an adult at one hundred and fifty pounds, for whom the appropriate dose

is one or one drachm, the dose of the drug must be increased or diminished in proportion of the weight of the patient to that number of pounds. This proportion is represented by a fraction whose numerator is the patient's weight and whose denominator is 150. If a child at birth weighs ten pounds, the proportionate dose for it would be $\frac{10}{150}$ or $\frac{1}{15}$. A child at two years weighing twenty pounds, would require $\frac{20}{150}$ or about $\frac{1}{7}$ of an adult dose. A person whose weight is two hundred pounds should have $\frac{200}{150}$ or $1\frac{1}{3}$ of an average adult dose.

- (d) Dr. Lauder-Burton proposes the following rule for calculating the dose for a child, in the metric system. Multiply the next birthday by four and divide the result by one hundred; or what is the same thing, multiply the full dose by the child's next birthday, then by four and remove the decimal point two places to the left. Thus if the dose for an adult be one gramme, that for a child of three years will be .160 gm.

VI. Constitution.—As a rule, the larger and more robust the individual, the less easily he is influenced by drugs.

DEFINITIONS.

- I. **Toxicology** is derived from two Greek words meaning "a treatise on poisons." It is the science which treats of the nature, symptoms, effects, doses and modes of detection of poisons.
- II. **A poison** is a substance capable of destroying life when taken in a small quantity; but a substance which destroys life by mechanical means, e. g., powdered glass, is not, strictly speaking, a poison.

Poisoning is probably the most frequent of all the causes of violent death at the present day.

The effects of poisons are local and indirect.

- (a) The local action of a poison is usually one of corrosion, inflammation, or a direct effect on the sensory or motor nerves, e. g., the corrosion of the stomach and bowels by direct contact of the mineral acids and alkalies. A poison may act both locally, by causing inflammation of the stomach, and remotely, on the brain and nervous system. Arsenic acts in this manner.
- (b) The indirect actions of poisons are those which are produced on parts of the system remote from the part to which it was first applied, e. g., opium taken into the stomach, followed by narcosis.

POISONS IN GENERAL.

I. Symptoms in General.—There rarely fail to be shown signs of the poison taken. Poisoning may be acute or chronic; we will here only consider the former, as this only will interest the pharmacist at the time being. The symptoms which should lead to suspect acute poisoning are:

(a) Sudden occurrence of severe and alarming symptoms in a person previously in good health.

(b) Several members of a family suddenly taken ill simultaneously, after partaking of the same food.

(c) Rapid course toward a fatal issue.

II. Treatment in General.—If taken into the stomach,

(a) Empty the stomach by means of stomach pump if not a corrosive poison; stomach tube or emetics.

(b) Antidotes.

1. Chalk to neutralize mineral acids and oxalic acid.

2. Alkaloids are rendered less soluble if astringents containing tannin are given.

(c) Counter poisons:

1. As atropine, which acts in opposition to morphine.

2. All these are best administered hypodermically, as they are absorbed in a pure state and more rapidly.

- (d) Protect the stomach, if irritants were taken, by administering mucilaginous drinks, or some bland fixed oil.
- (e) Relieve pain with morphine, if not contra-indicated.
- (f) Relieve convulsions, if poisoned by strychnine, with:
 - 1. Chloroform.
 - 2. Chloral hydrate.

CLASSIFICATION.

Poisons may be classified as:

- I. Corrosive Poisons.**
- II. Irritant Poisons.**
- III. Neurotic Poisons.**
- IV. Gaseous Poisons.**

I. CORROSIVE POISONS.

Include:

- 1. Corrosive sublimate.
- 2. Concentrated mineral acids, viz.: Hydrochloric, nitric and sulphuric.
- 3. Oxalic acid.
- 4. Alkalies, viz.: Ammonium hydrate, potassium hydrate, and sodium hydrate, as well as their carbonates.
- 5. Acid, alkaline, and corrosive salts of metals.
- 6. Carbolic acid.

A. Symptoms.—

- 1. Metallic, acid, or caustic burning sensations which extend from the mouth to the stomach; this is rapidly followed by vomiting.
- 2. The vomit contains blood and fragments of tissue.
- 3. Abdomen distended by gas and very tender.
- 4. High fever.
- 5. Tissues of the mouth are more or less destroyed.

6. Death may take place in a few hours or in a few months from starvation brought about from stricture of the œsophagus.

B. Treatment.—

1. Gently wash out stomach with stomach tube.
2. Demulcents to protect the stomach, such as mucilages, oils, eggs and milk.
3. Opiates for pain.

CORROSIVE SUBLIMATE.

A. Symptoms.—

1. Metallic, coppery taste.
2. Deglutition retarded or swallowing prevented.
3. Burning pain of œsophagus and stomach.
4. Violent vomiting, first mucous, then bilious, then bloody.
5. Severe abdominal pain and tenderness.
6. Profuse diarrhœa, later small mucous bloody stools.
7. Breath fetid and offensive.
8. The urine is diminished or it may be suppressed; it may contain albumen or even be bloody.
9. Symptoms of collapse in two or three hours.
 - (a) Small, frequent, irregular pulse.
 - (b) Pinched, anxious face.
 - (c) Cold extremities.
 - (d) Fainting.
 - (e) Convulsions.
 - (f) Coma.
 - (g) Death.

B. Fatal dose and period.—

1. The minimum fatal dose (for an adult) can be taken at three grains, although much larger quantities have been taken and vomited or neutralized.

2. Life is usually prolonged, from one to five days, although death has occurred in one half hour.

C. Treatment.—

1. Promote vomiting by warm diluent drinks.
2. Albumen or white of an egg beat up with water given freely. The white of an egg will neutralize 4 grains of corrosive sublimate if taken at once. Do not use too much egg albumen as an excess will re-dissolve the compound formed.
3. In the absence of egg, gluten or wheat flour in the form of paste should be freely given.
4. Give milk freely.
5. Sweet oil.
6. Morphine hypodermically.

MINERAL ACIDS.

A. Symptoms.—

1. Same as corrosive sublimate except:
 - (a) Accompanied by more intense thirst.
 - (b) Constipation, sometimes.
 - (c) Coughing and difficult respiration.
2. Sulphuric acid stains the tissues black.
3. Nitric acid stains the tissues yellow.
4. Hydrochloric acid stains the tissues gray or white, with the formation of a false membrane.

B. Fatal dose and period.—

1. The fatal dose of sulphuric acid for an adult is a fluid drachm. Death usually occurs within 24 hours.
2. The fatal dose of nitric acid for an adult is 2 fluid drachms, although larger doses have been taken. Death usually occurs within 24 hours.

3. The fatal dose of hydrochloric acid for an adult is half an ounce. Death varies from a few hours to many weeks.

C. Treatment.—

1. Administer alkalies or their carbonates in solution in water or milk, such as the bicarbonate of potassium or sodium, chalk, whiting or soap.
2. Give diluent demulcents copiously, such as barley water, oil, flaxseed tea, etc.
3. Do not use stomach pump, as you may perforate the œsophagus or stomach.

OXALIC ACID.

A. Symptoms.—

1. Same as corrosive sublimate, plus:—
 - (a) Acute pain in the back of the head.
 - (b) Intense thirst.
 - (c) Distressing cough.
 - (d) Accelerated respiration.
 - (e) Swelling of the tongue.
 - (f) Depressed heart action.
 - (g) Patient may suddenly fall unconscious immediately after taking the poison, with almost complete paralysis and numbness.
 - (h) Collapse early and marked.
 - (i) The urine contains crystals of oxalate of lime, albumen and tube casts.

B. Fatal dose and period.—

1. Three drachms usually prove fatal, although a drachm is known to have caused death.
2. It usually proves fatal within an hour.

C. Treatment.—

1. Chalk and magnesia mixed with milk.
2. Lime water and oil.

3. Opium, to relieve pain.
4. Alkalies and their carbonates should not be used because they form soluble poisonous compounds with the acid.

AMMONIA.

A. Symptoms.—

1. Abdominal pains.
2. Vomiting.
3. Bloody purging.
4. Suffocation may cause death.
5. Convulsions.
6. Coma.
7. Death.
8. Intellect may be clear to the last, or stupor and finally coma may develop.

B. Fatal dose and period.—

1. Death may occur in five minutes due to œdema of the larynx. If the patient survives several hours, recovery may occur, but death at times occurs from the organic lesions which have been produced.

C. Treatment.—

1. Weak solution of vinegar.
2. Lemon juice.
3. Citric or tartaric acid administered cautiously.
4. Demulcent drinks.

ALKALIES—OTHER THAN AMMONIA.

Under this heading come potassium hydrate, sodium hydrate, their carbonates, lime, etc.

A. Symptoms.—

Like those of ammonia poisoning.

B. Fatal dose.—

Indefinite.

C. Treatment.—

1. Dilute vinegar or lemon juice should be used freely.
2. Give oil and demulcents freely.
3. Give opium to relieve pain.
4. Stimulants to overcome depression.

CARBOLIC ACID.

A. Symptoms.—

1. Same as the mineral acids, plus:—
 - a.* Pupils are contracted.
 - b.* Breath smells like carbolic acid.
 - c.* Temperature falls rapidly.
 - d.* Mouth white and hardened.
 - e.* Labored respiration.
 - f.* Coma and death.
2. The urine is of an olive green color.

B. Fatal dose and period.—

1. One-half ounce has several times caused death; a little over a drachm has caused death in one case.
2. Patients usually live from one to ten hours, but death may occur in ten minutes.

C. Treatment.—

1. Stomach pump must be employed; emetics are useless on account of paralysis of the stomach.
2. Give sulphate of sodium or magnesium freely.
3. Albumen.
4. Demulcents.
5. Saccharate of lime.
6. Solutions of soap.
7. Oil is useful for external application.
8. Stimulate to overcome the depression by:—
 - (*a*) Inhalation of oxygen.
 - (*b*) Hypodermics of ether, etc.

II. IRRITANT POISONS.

Include:--

1. Metallic irritants and their compounds.—

Arsenic.
Lead.
Copper.
Zinc.
Nitrate of silver.
Phosphorus.
Iodine.

2. Vegetable Irritants.—

Elaterium.
Gamboge.
Aloes.
Colocynth.
Croton oil.

3. Animal irritants.—

Cantharides.

Symptoms in General.--

1. Slower in their action than the corrosives.
2. Burning pain in the mouth, throat, and œsophagus, with a feeling of pressure, then a burning pain in the region of the stomach, which is increased by pressure.
3. Thirst, nausea and vomiting.
4. Distention and tenderness of abdomen.
5. Profuse diarrhœa.
6. Collapse.
7. Death.

ARSENIC.

A. Symptoms.—

1. In about half an hour the patient feels depressed.
2. Burning pain and tenderness on pressure in the region of the stomach.
3. Nausea and vomiting.
4. Purging, bloody and offensive.
5. Thirst.
6. Feeble, rapid or irregular pulse.
7. Cold clammy skin.
8. Bloody urine.
9. Convulsions.
10. Coma.
11. Death.

B. Fatal dose and period.—

1. Two grains is probably the minimum fatal dose.
2. Death usually takes place in from 12 to 72 hours.

C. Treatment.—

1. Emetics—sulphate of zinc, ipecac or mustard in water. Stomach pump if at hand.
2. Warm diluent drinks.
3. Hydrated sesquioxide of iron with magnesia given in large doses and frequently repeated.
4. Castor oil.

LEAD.

A. Symptoms.—

1. Like arsenic, plus:—
 - (a) Blue line on gums where they join the teeth.
 - (b) Lead in the urine.
 - (c) Usually constipation instead of diarrhœa.
 - (d) May have severe pain in the joints and limbs and cramps.

(c) Lead colic pains in the region of the umbilicus, nausea, vomiting, etc.

B. Fatal dose and period.—

1. All the salts of lead are poisonous except the sulphate, which is insoluble.
2. Acute lead poisoning is rare, except by accident, but chronic lead poisoning occurs quite frequently.
3. The minimum fatal dose of all the salts of lead is very uncertain.
4. The fatal period is also very uncertain, varying from a few hours to a few days.

C. Treatment.—

1. Emetics, as sulphate of zinc.
2. Milk and white of eggs.
3. Sulphate of magnesia.
4. Castor oil.

COPPER.

A. Symptoms.—

1. Like arsenic, plus:—
 - (a) Usually begin about fifteen minutes after taking the poison, but they may not appear for two hours.
 - (b) The vomit is greenish or bluish.
 - (c) Strong copper taste in the mouth.
 - (d) Excessive salivation and bronchial secretions are characteristic.
 - (e) Death may occur in a few hours preceded by syncope, paralysis, delirium and anæsthesia.
 - (f) Jaundice is always present if the patient lives twenty-four hours.

B. Fatal dose and period.—

1. The fatal dose is uncertain, an ounce of the sul-

phate has proved fatal and half an ounce of the subacetate.

2. Death usually takes place in from four to twelve hours.

C. Treatment.—

1. Emetics or stomach pump.
2. Whites of eggs stirred up with a little water, given repeatedly.
3. Milk.
4. Yellow prussiate of potash.
5. Soap or a fixed alkali.
6. Opium to relieve pain.

ZINC.

A. Symptoms.—

1. Like copper, plus.
 - (a) Dilated pupils.
 - (b) Coma.
 - (c) Death.

B. Fatal dose and period.—

1. Sulphate of zinc in a dose of from $\frac{1}{2}$ to 1 ounce will cause death. Death usually takes place within fifteen hours.
2. The fatal dose of chloride of zinc is not known. Death may take place within four hours, but it may take months.

C. Treatment.—

1. Emetics or stomach pump.
2. White of egg.
3. Milk.
4. Diluent drinks.
5. Opium for pain.

NITRATE OF SILVER.

A. Symptoms.—

1. Like arsenic, plus:—

- (a) Insensibility.
- (b) Violent convulsions.
- (c) Dilated pupils.
- (d) Great muscular weakness.
- (e) Paralysis.
- (f) Disturbed respiration.
- (g) Discoloration of lips and skin, first white, then black.
- (h) Vertigo.
- (i) Brownish or blackish vomit.
- (j) Coma.
- (k) Death.

B. Fatal dose and period.—

- 1. The fatal dose varies; death has been caused by 30 grains. Recovery has taken place after an ounce had been taken.

C. Treatment.—

- 1. Emetics.
- 2. Common salt in large quantities.
- 3. Milk in large quantities.

PHOSPHORUS.

A. Symptoms.—

- 1. Like arsenic, but it takes from three to twelve hours for first symptoms to appear. In addition to these symptoms we have:—
 - (a) Vomit at times smells of phosphorus. In early part is luminous in the dark.
 - (b) Vomiting stops on second or third day, and begins again with the jaundice, when it becomes of a dark color, due to the mixture with the blood.

- (c) Tongue is white or very red.
 - (d) Loss of appetite.
 - (e) Thirst.
 - (f) There is usually fever followed by subnormal temperature. Urine scanty, albuminous, and may contain sugar.
 - (g) Nervous symptoms develop after jaundice is present.
2. Delirium.
 3. Coma.
 4. Death.

B. Fatal dose and period.—

1. Less than a grain has proved fatal.
2. Death usually takes place in from one to five days.

C. Treatment.—

1. Emetics, albuminous and demulcent drinks with hydrate of magnesia.
2. Copper sulphate.
3. "French" oil of turpentine.
4. Animal charcoal.
5. Nitrate of silver.
6. Stimulants.

IODINE.

A. Symptoms.—

1. Very few deaths are recorded as caused by it.
2. Burning heat in the throat, œsophagus and stomach.
3. Severe pain in the abdomen.
4. Vomit smells of iodine; is of a yellowish color, except when it consists of starchy substance, in which case it is blue; sometimes it is mixed with blood.

5. Purging, which may show the presence of iodine.
6. Pulse small and frequent.
7. Pallor.
8. Lessening or suspension of urine, dark brown and rich in iodine.
9. Eruptions on the skin about the fourth day.
10. Headache and giddiness.
11. Thirst and anxiety.
12. Convulsions
13. Collapse.
14. Death.

B. Fatal dose and period.—

1. Twenty grains has caused death.
2. Death usually takes place within ten days.

C. Treatment.—

1. Starch in water.

CROTON OIL.

A. Symptoms.—

1. Violent vomiting.
2. Purging.
3. Symptoms of collapse.

B. Fatal dose and period.—

1. Thirty minims have caused death.
2. Two and one-half drachms have caused death in four hours.
3. Recovery took place, after taking two and one-half drachms, in fourteen days, after severe vomiting, purging and collapse.

C. Treatment.—

1. Emetics.
2. Demulcent drinks.
3. Morphine hypodermically.
4. Symptomatic.

CANTHARIDES.

A. Symptoms.—

1. Like arsenic, plus:

- (a) Great thirst.
- (b) Dry throat.
- (c) Dull heavy pains in the loins.
- (d) Constant desire to urinate, with great pain, passing only a few drops of bloody urine.
- (e) Priapism in men and swelling and heat of the labia in women.
- (f) Bloody diarrhœa.
- (g) May be salivation
- (h) Syncope.
- (i) Convulsions.
- (j) Coma.
- (k) Death.

B. Fatal dose and period.—

- 1. Twenty-five grains of the powder and an ounce of the tincture, each have caused death within two weeks.

C. Treatment.—

- 1. Emetics or stomach pump.
- 2. Demulcent drinks.
- 3. Opium per rectum.
- 4. Stimulants.

III. NEUROTIC POISONS.

Include.—

- 1. Aconite.
- 2. Alcohol.
- 3. Belladonna.
- 4. Chloral hydrate.
- 5. Chloroform.
- 6. Cocaine.
- 7. Cocculus,

8. Colchicum.
9. Conium.
10. Hydrocyanic acid.
11. Mushroom.
12. Opium.
13. Physostigma.
14. Ptomaines.
15. Strychnine.

ACONITE.

A. Symptoms.—

1. Come on in a few minutes.
2. Throat dry.
3. Tingling and numbness of lips, throat and tongue.
4. Nausea and vomiting.
5. Pain and tenderness of abdomen.
6. Numbness and anæsthesia become general.
7. Vertigo.
8. Dimness of vision.
9. Tinnitus aurium—may be deaf.
10. Frothing of mouth.
11. Weakness—unable to walk.
12. Slow, feeble pulse.
13. Labored breathing.
14. Cold clammy skin.
15. Dilated pupils.
16. Pale features.
17. Mind is usually clear.
18. Death may be sudden.
19. Slight convulsions.

B. Fatal dose and period.—

1. Five grains of the extract and eighty minims of the tincture have each caused death.
2. Death occurs within five hours.

C. Treatment.—

1. Empty the stomach—emetics or stomach pump.
2. Dorsal *décubitus*, elevate feet.
3. Stimulate, alcohol, ether, digitalis hypodermically and inject ammonia into the veins.
4. Artificial respiration.
5. Nitrite of amyl inhaled.

ALCOHOL.

A. Symptoms.—

1. Usually come on in a few minutes.
2. Giddiness.
3. Confusion of mind.
4. Staggering.
5. Incoherent talking.
6. Stupor.
7. Coma.
8. Face pale or red.
9. Pupils are usually dilated.
10. Breath smells of alcohol or aldehyde.
11. Jerky movement of limbs.
12. Labored breathing.

B. Fatal dose and period.—

1. Fatal dose indefinite.
2. Death may occur in one half hour, or the patient may appear well, and later die in convulsions.

C. Treatment.—

1. Empty stomach—emetic or stomach pump.
2. Dash cold water over head.
3. Fresh air.
4. Electricity.
5. Ammonia.
6. Coffee.

BELLADONNA.

A. Symptoms.—

1. Usually come on in from one-half to two hours.
2. Heat and dryness of mouth and throat.
3. Difficult swallowing.
4. Respiration accelerated.
5. Pupils dilated.
6. Face flushed.
7. Nausea and vomiting,
8. Rapid pulse.
9. Talkative delirium.
10. Convulsions.
11. Stupor.
12. Coma.
13. Death.

B. Fatal dose and period.—

1. One-half to three quarters of a grain of atropine is the minimum adult lethal dose.
2. Death usually takes place within twenty-four hours.

C. Treatment.—

1. Empty stomach—emetics or stomach pump.
2. Tannic acid given freely.
3. Pilocarpine hypodermically.
4. Draw urine.
5. Stimulate the circulation and respiration, by:
 - (a) Heat and mustard externally.
 - (b) Alternate hot and cold douches.
 - (c) Artificial respiration.
 - (d) Whisky and ammonia hypodermically.

CHLORAL HYDRATE.

A. Symptoms.—

1. Deep sleep.

2. Pulse slow and feeble.
3. Respiration slow.
4. Face pale.
5. Coma.
6. Death..

B. Fatal dose and period.—

1. Thirty grains has caused death.
2. Recovery has taken place after the ingestion of over an ounce.

C. Treatment.—

1. Similar to that of opium poisoning.
2. Alcoholic and external stimulants used freely.
3. Artificial respiration.
4. Inhalation of oxygen.
5. Strychnine hypodermically.
6. Atropine.
7. Coffee.
8. Ammonia.

CHLOROFORM.

A. Symptoms.—

1. By the mouth—
 - (a) Nausea and vomiting.
 - (b) Colicky pains in abdomen.
 - (c) Insensibility.
 - (d) Convulsions.
 - (e) Dilated pupils.
 - (f) Flushed face.
 - (g) Full and oppressed pulse.

B. Fatal dose and period.—

1. By the mouth—
 - (a) One half ounce has often caused death.
2. By inhalation—
 - (a) Thirty drops has caused death in one minute.

- (b) Fifteen drops has caused death in a short time.

C. Treatment.—

1. By the mouth—

(a) Empty the stomach--emetic or stomach pump.

(b) Stimulate, digitalis, strychnine, etc.

2. By inhalation—

(a) Withdraw the chloroform.

(b) Fresh air.

(c) Cold affusions to face and chest.

(d) Elevate feet.

(e) Draw tongue out of mouth to facilitate respiration.

(f) Strychnine and digitalis hypodermically.

(g) Artificial respiration.

COCAINE.

A. Symptoms.—

1. Great restlessness and nervous excitement.
2. Accelerated pulse, but it may be slow and feeble.
3. Respiration increased in frequency.
4. Muscular twitchings or mild convulsions.
5. May be nausea and vomiting.
6. Pupils are dilated.
7. May have violent epileptiform convulsions.
8. Consciousness is usually lost.
9. May have mania with hallucinations and delusions.
10. Death.

B. Fatal dose and period.—

1. Twenty-four grains per rectum proved fatal.
2. Twenty drops of a 4 per cent solution, given

hypodermically to a girl of twelve years, caused death in forty seconds.

3. One drachm of a 20 per cent solution, injected into the urethra, caused death in fifteen minutes.

C. Treatment.—

1. Emetics.
2. Digitalis, strychninæ and morphine, hypodermically.

FISH BERRIES.

A. Symptoms.—

1. Usually occur within half an hour.
2. Loss of voluntary power.
3. Nausea and vomiting.
4. Severe abdominal pain.
5. Faintness and confusion of mind.
6. Dimness of vision.
7. Excessive thirst.
8. Pulse weak.
9. Respiration slow and labored.

B. Fatal dose and period.—

1. Fatal dose indefinite.
2. Death may occur within half an hour.

C. Treatment.—

1. Emetics.
2. Demulcent drinks.

COLCHICUM.

A. Symptoms.—

1. Nausea, retching, and uncontrollable vomiting.
2. Violent purging.
3. Gripping abdominal pain.
4. Burning pain in the throat and stomach.

5. Pulse first frequent and feeble, later rapid and thready.
6. Cold, clammy, pale or livid skin.
7. Consciousness is preserved until the last.
8. Collapse.
9. Delirium and convulsions may be present.

B. Fatal dose and period.—

1. Half an ounce of the wine of the root, forty-five grains of the dried bulb, and a tablespoonful of the seeds have each proved fatal.
2. Death usually occurs within 24 hours.

C. Treatment.—

1. There is no known antidote.
2. Emetics or stomach pump.
3. Strychnine.
4. Digitalis hypodermically.
5. Caffeine.
6. Demulcent drinks.
7. Castor oil.

CONIUM.

A. Symptoms.—

1. Headache.
2. Disturbed vision.
3. Dilated pupils.
4. Gradual paralysis of the extremities.
5. Eyes are kept shut.
6. Pulse at first diminished, later increased.
7. Death from paralysis of respiration.
8. Should death be delayed there may be convulsions, coma, delirium, and paralysis of the sphincters.

B. Fatal dose and period. -

1. One drachm of conium is usually a fatal dose.
2. Death usually takes place within three hours.

C. Treatment.—

1. Emetics.
2. Castor oil.
3. Strychnine hypodermically.
4. Digitalis.
5. Whiskey.

HYDROCYANIC ACID.

A. Symptoms.—

1. Come on almost immediately.
2. General paralysis.
3. Respiration is prolonged and forced.
4. Pulse is imperceptible.
5. Eyes glassy and prominent.
6. Pupils dilated.
7. Odor of prussic acid upon the breath.
8. Unconsciousness.
9. Violent convulsions.
10. Death.

B. Fatal dose and period.—

1. Fifty minims of the official acid may be considered the adult lethal dose.
2. Death usually occurs within ten to fifteen minutes.

C. Treatment.—

1. Empty stomach.
2. Atropine hypodermically.
3. Alternate hot and cold douches.
4. Ammonia by mouth, inhalation and injection into the veins.
5. Chlorine by mouth, inhalation and external application.
6. Artificial respiration.
7. A mixture of ferrous and ferric sulphate preceded by a cream of carbonate of magnesium and water.

AGARIC OR POISONOUS MUSH-ROOM.

A. Symptoms.—

1. Usually appear within half an hour.
2. Violent vomiting and purging.
3. Abdominal pains.
4. Dimness of vision.
5. Dilated pupils.
6. Delirium.
7. Stupor.
8. Coma.
9. Trembling.
10. Convulsions.
11. Death.

C. Treatment.—

1. Emetics.
2. Daturine hypodermically.
3. Chloroform in 30 drop doses.
4. Morphine.
5. Strychnine.
6. Digitalis.

OPIUM.

A. Symptoms.—

1. Giddiness.
2. Stupor.
3. Clammy skin.
4. Slow full pulse.
5. Itching of nose.
6. Drowsiness.
7. Coma.
8. Slow stertorous breathing.
9. Contracted pupils (pin point.)
10. Reflexes abolished.
11. Death from respiratory failure.

B. Fatal dose and period.--

1. Four grains may be considered the minimum adult lethal dose.
2. Death usually takes place in from seven to twelve hours.

C. Treatment.--

1. Empty stomach—emetics or stomach pump.
2. Draw urine.
3. Atropine hypodermically.
4. Permanganate of potassium hypodermically.
5. Strychnine.
6. Caffeine.
7. Cocaine.
8. Electricity.
9. Cold affusions.
10. Artificial respiration.
11. Keep in motion.

PHYSOSTIGMA.

A. Symptoms.--

1. Giddiness.
2. Lessened heart action.
3. Muscular tremor.
4. Muscular flaccidity—falls to the ground.
5. Pupils contract.
6. Respiration slow, irregular and stertorous.
7. Reflexes abolished.
8. Voice is completely lost.
9. Body temperature is slightly elevated.
10. Vomiting and purging may be present.
11. Convulsions may be present.
12. Consciousness is retained.
13. Death from paralysis of respiration.

B. Treatment.--

1. Empty the stomach—emetics or stomach pump.

2. Dry heat externally.
3. Atropine hypodermically, gr., $\frac{1}{60}$ every two hours until three doses have been given.

STRYCHNINE.

A. Symptoms.—

1. Usually appear within one half hour.
2. Restlessness and general uneasiness.
3. Twitching of the muscles and jerking of the limbs and head.
4. Violent tetanic convulsions of the whole body.
5. During contraction of the muscles of the chest and abdomen, respiration is arrested.
6. Face is livid and congested.
7. Eyes prominent and staring.
8. Pupils dilated.
9. Pulse rapid and feeble.
10. Consciousness is retained.
11. Great thirst.
12. Death from paralysis of respiration.

B. Fatal dose and period.—

1. Half a grain is the smallest fatal adult dose.
2. Recovery has taken place after taking forty grains.
3. Death usually takes place within an hour.

C. Treatment.—

1. Empty the stomach—emetic or stomach pump.
2. Chloroform by inhalation for convulsions.
3. Potassium bromide with chloral hydrate in large doses every half hour.
4. Atropine, when chloroform fails.
5. Nitrite of amyl by inhalation.
6. Artificial respiration.
7. Paraldehyde.

IV. GASEOUS POISONS.

Include:

1. Carbonic acid gas.
2. Carbon monoxide or illuminating gas.
3. Chlorine and bromine gases.
4. Coal--illuminating gas.
5. Sulphuretted hydrogen gas.

CARBONIC ACID GAS.

A. Symptoms.—

1. Stertorous breathing.
2. Oppression.
3. Flushed face.
4. Eyes protrude.
5. Swollen tongue.
6. Feeble pulse.

B. Treatment.—

1. Fresh air.
2. Alternate hot and cold douches to chest.
3. Friction of limbs and trunk.
4. Artificial respiration.
5. Stimulate--strychninæ, digitalis, etc.

CARBON MONOXIDE OR ILLUMINATING GAS.

A. Symptoms.—

1. Headache.
2. Pressure in region of temples.
3. Vertigo.
4. Ringing in the ears.
5. Tendency to sleep.
6. Loss of muscular power.
7. Impaired vision.
8. Labored breathing.

9. Rapid feeble pulse.
10. Vomiting.
11. Coma.
12. Convulsions.
13. Death from asphyxia; this usually occurs within two hours.

B. Treatment.—

1. Fresh air.
2. Artificial respiration.
3. Alternate hot and cold douches.
4. Stimulate.
5. Electricity.

CHLORINE AND BROMINE GASES.

A. Symptoms.—

1. Violent convulsive cough.
2. Bloody expectoration.
3. Spasm of the glottis.
4. Darting pains through the chest.
5. Sneezing.
6. Profuse flow of tears.
7. Pneumonia in severe cases.
8. Dyspnoea.
9. Death from asphyxia.

B. Treatment.—

1. Fresh air.
2. Inhalation of warm aqueous vapor of ammonia to form ammonium chloride.
3. Chloroform.
4. Narcotics.

COAL GAS—ILLUMINATING GAS.

A. Symptoms.—

1. Headache.

2. Confusion of intellect.
3. Vertigo.
4. Nausea and vomiting.
5. Loss of consciousness and insensibility.
6. Complete prostration.
7. Convulsions.
8. Death from asphyxia.

B. Treatment.—

1. Fresh air.
2. Artificial respiration.
3. Alternate hot and cold douches.
4. Stimulate.
5. Electricity.

SULPHURETTED HYDROGEN GAS.

A. Symptoms.—

1. Sense of fullness and pain in the stomach.
2. Vertigo.
3. Nausea.
4. Loss of muscular power and consciousness.
5. Escape of blood from the mouth.
6. Body cold.
7. Face livid.
8. Pupils dilated and fixed.
9. Convulsions.
10. Coma.
11. Death from asphyxia.

B. Treatment.—

1. Fresh air.
2. Friction.
3. Warmth.
4. Stimulate—strychnine, digitalis, etc.

PTOMAINES.

A. Symptoms.—

1. These usually come on within thirty-six hours of partaking of the poisonous meat, sausage, milk, shell fish or fish.
2. Languor and ill health.
3. Loss of appetite.
4. Nausea.
5. Gripping pains in abdomen; diarrhœa and vomiting.
6. May be chilliness or rigor.
7. Headache, giddiness or faintness.
8. Cold sweats.
9. Stools offensive and of a dark color.
10. Muscular weakness pronounced.
11. Intense thirst.
12. Tongue coated.
13. Temperature 101 to 104.
14. Pulse 100 to 125.
15. Collapse.
16. Death.

B. Treatment.—

1. Symptomatic.
2. Calomel.
3. Stimulants.
4. Demulcents,
5. Baths.
6. Food to be given cautiously.

POSOLOGICAL TABLE,

OR

A LIST OF MEDICINAL DRUGS WITH DOSES.

The doses here given are the ordinary adult doses.

The hypodermic dose is usually about one half the ordinary dose.

The dose per rectum is from one and a half to two or three times the ordinary dose except strychnine and possibly a few other drugs.

Absinthe, 15-30 gr.	Phosphoric, 3-7 min.
Acetanilid, 3-20 gr.	" dil., 5-40 min.
Acid, Acetic, 15-30 min.	Salicylic, 5-20 gr.
Arsenous, $\frac{1}{100}$ - $\frac{1}{10}$ gr.	Sulphuric dil., 10-20 min.
Benzoic, 10-30 gr.	" arom., 5-20 min.
Boric, 10-30 gr.	Tannic, 3-10 gr.
Carbolic, 1-3 gr.	Tartaric, 5-25 gr.
Citric, 10-40 gr.	Valerianic, 2-5 min.
Formic, 3-5 min.	Aconite, $\frac{1}{2}$ -2 gr.
Gallic, 3-30 gr.	Aconite leaves, 1-2 gr.
Hydrobromic Dil, $\frac{1}{2}$ -2 f 3.	Aconitine, $\frac{1}{100}$ - $\frac{1}{10}$ gr.
Hydrochloric, 5-10 min.	Acontin, $\frac{1}{4}$ - $\frac{1}{2}$ gr.
" dil. 10-30 min.	Agaricin, $\frac{1}{80}$ - $\frac{1}{4}$ gr.
Hydrocyanic, 1-5 min.	Aletrin, $\frac{1}{2}$ -2 gr.
Lactic U. S. P., $\frac{1}{2}$ -2 f 3.	Allium (garlic), 15-60 gr.
Nitric dil. 5-30 min.	Aloes, Barbadoes, $\frac{1}{2}$ -10 gr.
Nitro hydrochloric, 2-5 min.	Aloes, Socotrine, 2-20 gr.
" " dil., 10-	Aloin, $\frac{1}{8}$ -2 gr.
30 min.	Alum, 10-60 gr.
Oxalic, $\frac{1}{2}$ -1 gr.	Aluminum hydrate, 1-10 gr.

Ammoniac, 5-25 gr.
 Ammonium bromide, 5-60 gr.
 Ammonium carbonate, 5-15 gr.
 Ammonium chloride, 5-30 gr.
 Ammonium iodide, 3-10 gr.
 Ammonia, water of, (10%), 10-30 min.
 Ammonium valerianate, 2-10 gr.
 Amyl nitrite, 2-4 min.
 Aniline, 1-2 gr.
 Anise, 10-30 gr.
 Anthemis, 30-120 gr.
 Antifebrim, 3-20 gr.
 Antimony and potash tartrate, $\frac{1}{8}$ -3 gr.
 Antimony oxysulphide, 1-3 gr.
 Antipyrine, 3-20 gr.
 Apiol, 2-5 min.
 Apomorphine, muriate, $\frac{1}{10}$ - $\frac{1}{4}$ gr.
 Argentic nitrate, $\frac{1}{8}$ - $\frac{1}{2}$ gr.
 Argentic oxide, $\frac{1}{2}$ -2 gr.
 Arnica flowers, 10-20 gr.
 Arnica root, 5-20 gr.
 Arsenic, bromide, $\frac{1}{4}$ - $\frac{1}{6}$ gr.
 Arsenic, chloride, $\frac{1}{10}$ - $\frac{1}{8}$ gr.
 Arsenic, iodide, $\frac{1}{10}$ - $\frac{1}{8}$ gr.
 Assafoetida, 5-60 gr.
 Atropine, $\frac{1}{100}$ - $\frac{1}{50}$ gr.
 " sulphate, $\frac{1}{100}$ - $\frac{1}{50}$ gr.
 Aurum, chloride, $\frac{1}{10}$ - $\frac{1}{8}$ gr.
 Auri et sodii chloridum, $\frac{1}{10}$ - $\frac{1}{8}$ gr.
 Balsam Peru, 10-30 min.
 Balsam copaiba, 5-60 min.
 Berberine, $\frac{1}{4}$ -5 gr.
 Berberine sulphate, 1-10 gr.
 Belladonna leaves, 1-3
 " root, 1-3 gr.
 Bismuth citrate, 1-5 gr.
 Bismuth salicylate, 5-10 gr.
 Subcarbonate, 10-60 gr.
 Subgallate, 5-30 gr.
 Subnitrate, 5-100 gr.
 Tannate, 5-30 gr.
 Bromoform, 1-5 min.
 Bryony, 10-60 gr.
 Buchu, 15-60 gr.
 Butyl-chloral, 5-10 gr.
 Caffeine, 1-3 gr.
 " citrate, 1-5 gr.
 Calcium, bromide, 5-60 gr.
 Carbonate, 5-40 gr.
 Chloride, 1-15 gr.
 Hypophosphite, 5-25 gr.
 Iodide, 5-20 gr.
 Phosphate, 10-40 gr.
 Sulphite, $\frac{1}{4}$ -5 gr.
 Calumbo, 5-30 gr.
 Camphor, 1-10 gr.
 Camphor monobromate, 1-5 gr.
 Cannabis indica, 2-5 gr.
 Cannabine tannate, 1-10 gr.
 Capsicum, 3-5 gr.
 Castanæ, $\frac{1}{2}$ -2 dr.
 Catechu, 10-30 gr.
 Caulophyllum, 5-25 gr.
 Caulophyllin, $\frac{1}{2}$ -2 gr.
 Cerium oxalate, 1-5 gr.
 Chenopodium, 10-25 gr.
 Chloral, 5-25 gr.
 Chloroform, 2-30 min.
 Cimicifuga, 10-30 gr.
 Cinchona, 30-60 gr.
 Cinnamon, 10-30 gr.
 Coca, 15-60 gr.
 Cocaine, $\frac{1}{8}$ -2 gr.
 Codeine, $\frac{1}{4}$ -6 gr.
 Codeine sulphate, $\frac{1}{4}$ -6 gr.
 Colchicine, $\frac{1}{10}$ - $\frac{1}{50}$ gr.
 Colocynth, 1-8 gr.
 Colocynthin, $\frac{1}{4}$ -1 gr.
 Conium, 2-5 gr.
 Convallaria, 5-30 gr.
 Creosote, 1-20 gtt.
 Crocus, 5-30 gr.
 Copper Arsenite, $\frac{1}{100}$ -1 gr.
 " Subacetate, $\frac{1}{8}$ - $\frac{1}{2}$ gr.

Copper Sulphate (emetic), $\frac{1}{2}$ -10 gr.

Cubeb, $\frac{1}{4}$ -3 dr.

Cundurango, 20-40 gr.

Daturine, $\frac{1}{160}$ - $\frac{1}{4}$ gr.

Decoctions, base dose on percentage of drug.

Digitalis, $\frac{1}{2}$ -3 gr.

Digitalin, $\frac{1}{4}$ - $\frac{1}{8}$ gr.

Duboisine, $\frac{1}{100}$ - $\frac{1}{50}$.

Elaterium, $\frac{1}{16}$ - $\frac{1}{2}$ gr.

Elaterine, $\frac{1}{32}$ - $\frac{1}{8}$ grain.

Elixirs, dose based on percentage of drug.

Emetine, $\frac{1}{160}$ - $\frac{1}{8}$ gr.

Ergot, 15-60 gr.

Ergotine, 2-5 gr.

Eucalyptol, 5-30 min.

Eucalyptus, $\frac{1}{2}$ -1 dr.

Euonomin, 2-5 gr.

Euonymus, 60-120 gr.

Europhen, 1-5 gr.

Exalgine, 1-5 gr.

Extracts and Fluid Extracts, dose based on drug strength of preparation.

Fel Bovis, 3-10 gr.

Frangula, $\frac{1}{2}$ -2 dr.

Galls, $\frac{1}{2}$ -1 dr.

Gelsemium, 5-10 gr.

Gelsemine, $\frac{1}{10}$ - $\frac{1}{50}$ gr.

Gelsemine, hydrochlorate, Sulphate,

Tartrate, $\frac{aa}{160}$ - $\frac{1}{50}$ gr.

Gentian, 5-30 gr.

Ginger, 10-30 gr.

Glycerine, 10 min.,—2 dr.

Gossypium, 1-5 gr.

Gossypium, bark of root, 15-60 gr.

Grindelia, 15-60 gr.

Guaiac, resin, 5-30 gr.

Guaicol, $\frac{1}{2}$ - $1\frac{1}{2}$ gr.

“ carbonate, 5-60 gr.

Guarana, $\frac{1}{4}$ -1 dr.

Hæmogallol, 2-6 gr.

Hæmoglobin, 1-3 gr.

Hellebore, 4-16 gr.

Helonias, 5-15 gr.

Homatropine hydrobromate $\frac{1}{100}$ - $\frac{1}{5}$ gr.

Hydrastis, 30-60 gr.

Hydrochinon, 5-10 gr.

Hyoscine hydrobromate, $\frac{2}{100}$ - $\frac{1}{100}$ gr.

Hyoscyamin, $\frac{1}{8}$ -1 gr.

Hyoscyamine, $\frac{1}{16}$ - $\frac{1}{80}$ gr.

Hyoscyamus, 5-15 gr.

Ichthyol, 3-10 gr.

Ignatia, 1-2 gr.

Infusions—dose based on percentage of drug.

Inula, 15-60 gr.

Inulin, 1-3 gr.

Iodoform, $\frac{1}{2}$ -5 gr.

Iodine, $\frac{1}{4}$ -1 gr.

Ipecac, $\frac{1}{2}$ -30 gr.

Iris, 10-30 gr.

Iron reduced, 1-5 gr.

Iron, Acetate, 3-10 gr.

Bromide, $\frac{1}{2}$ -2 gr.

Carbonate, 5-15 gr.

Chloride, 1-3 gr.

Citrate, 3-5 gr.

and potash tartrate, 10-30 gr.,

and quinine citrate, 3-10 gr.,

and strychnine citrate, 1-3 gr.

Ferrocyanide, 2-5 gr.

Iodide, 1-5 gr.

Phosphate, 5-10 gr.

Pyrophosphate, 2-5 gr.

Subcarbonate, 5-30 gr.

Sulphate, 1-5 gr.

Valerianate, $\frac{1}{2}$ -2 gr.

Jalap, 10-30 gr.

Kamala, 1-2 dr.

Kino, 5-30 gr.

Kola, 5 gr.-2 dr.

Koussoo, 2-3 dr.

Krameria, 5-30 gr.
 Lactucarium, 5-60 gr.
 Lead acetate, 1-5 gr.
 Leptandra, 15-60 gr.
 Lithium benzoate, 10-30 gr.
 " bromide, 5-25 gr.
 " carbonate, 3-15 gr.
 " citrate, 10-30 gr.
 " iodide, 1-8 gr.
 " salicylate, 10-30 gr.
 Lobelia, 1-10 gr.
 Lupulin, 5-15 gr.
 Macrotin, $\frac{1}{2}$ -2 gr.
 Magnesia, light, 5-60 gr.
 " heavy, 5-20 gr.
 Magnesia, carbonate, 1-3 dr.
 " sulphate, 4-12 dr.
 Manganese, binoxide, 2-10 gr.
 " hypophosphite, 10-30 gr.
 Mass of mercury, 3-10 gr.
 Matricaria, 15-60 gr.
 Menthol, 1-5 gr.
 Mercury, chloride, (ic) $\frac{1}{80}$ - $\frac{1}{10}$ gr.
 Mercury, chloride (ous), $\frac{1}{80}$ -10 gr.
 Mercury, iodide, (ic) $\frac{1}{80}$ - $\frac{1}{4}$ gr.
 Iodide, (ous) $\frac{1}{2}$ -2 gr.
 Tannate, $\frac{1}{2}$ -1 $\frac{1}{2}$ gr.
 With chalk, 3-10 gr.
 Methyl salicylate, 1-5 min.
 Mezereum, 5-15 gr.
 Morphine, $\frac{1}{8}$ - $\frac{1}{4}$ gr.
 Morphine, acetate, $\frac{1}{8}$ - $\frac{1}{4}$ gr.
 Other salts of morphine $\frac{1}{8}$ - $\frac{1}{2}$ gr.
 Naphthaline, 2-10 gr.
 Naphtol, 2-15 gr.
 Naphtol, Alpha, $\frac{1}{2}$ -5 gr.
 Narceine, $\frac{1}{10}$ - $\frac{1}{2}$ gr.
 Narcotine, 2-10 gr.
 Nicotine, $\frac{1}{8}$ gr.
 Nitroglycerine, $\frac{1}{100}$ - $\frac{1}{50}$ gr.
 Nux vomica, $\frac{1}{4}$ -4 gr.
 Oil, Almond, bitter, $\frac{1}{4}$ min.
 Almond, sweet, $\frac{1}{2}$ oz.
 Cajeput, 1-5 min.
 Castor, 1 dr.-1 oz.
 Cinnamon, 1-5 min.
 Cloves, 1-5 min.
 Copaiba, 5-15 min.
 Croton, $\frac{1}{2}$ -2 min.
 Cubebs, 5-15 min.
 Erigeron, 5-30 min.
 Eucalyptus, 5-15 min.
 Juniper, 5-15 min.
 Lavander, 1-5 min.
 Linseed, 30 min. 1 oz.
 Morrhuæ, 2-8 dr.
 Olives, 1-16 dr.
 Peppermint, 1-5 min.
 Phosphorated, 1-5 min.
 Rue, 1-4 min.
 Savine, 1-5 min.
 Sandalwood, 5-30 min.
 Sassafras, 1-5 min.
 Turpentine, 5-120 min.
 " rectified, 5-30 min.
 Thyme, 1-5 min.
 Oleoresin capsicum, $\frac{1}{4}$ -1 min.
 " cubeb, 5-30 "
 " ginger, $\frac{1}{2}$ -2 "
 " lupulin, 3-5 "
 " malefern, 20-60 "
 " pepper, $\frac{1}{2}$ -2 "
 Opium, $\frac{1}{4}$ -2 gr.
 Pancreatine, 5-15 gr.
 Papaverine, $\frac{1}{10}$ - $\frac{1}{4}$ gr.
 Paraldehyde, 1-3 gr.
 Pariera brava, 30-60 gr.
 Pelletierine, 2-8 gr.
 " tannate, 5-10 gr.
 Pepsin, 1-20 gr.
 Phenacetine, 5-25 gr.
 Phosphorus, $\frac{1}{100}$ - $\frac{1}{50}$ gr.
 Physostigma, $\frac{1}{2}$ -2 gr.
 Physostigmine and salts of, $\frac{1}{100}$ - $\frac{1}{50}$ gr.
 Phytolacca, 5-30 gr.

Picrotoxine, $\frac{1}{10}$ – $\frac{1}{5}$ gr.
 Pilocarpine salts, $\frac{1}{10}$ – $\frac{1}{5}$ gr.
 Pilocarpus, 5–60 gr.
 Piperazine, 5–8 gr.
 Piperine, 1–10 gr.
 Pix Liquida $\frac{1}{4}$ –1 dr.
 Podophyllin, $\frac{1}{10}$ – $\frac{1}{5}$ gr.
 Podophyllum, 5–30 gr.
 Potash acetate, 5–60 gr.
 " bicarbonate, 10–60 gr.
 " bitartrate, 1–8 dr.
 " bromide, 10–60 gr.
 " carbonate, 10–30 gr.
 " chloride, 5–15 gr.
 " citrate, 15–60 gr.
 " and soda tartrate, $\frac{1}{8}$ –
 1 oz.
 " hypophosphite, 5–30
 gr.
 " iodide, 5–60 gr.
 " permanganate, $\frac{1}{4}$ –2
 gr.
 Propylamine, 1–2 gr.
 Pulsatilla, 1–5 gr.
 Quassia, 10–30 gr.
 Quinine 1–30 gr.
 " acetate, 2–20 gr.
 " arsenate, $\frac{1}{8}$ – $\frac{1}{4}$ gr.
 " bisulphate, 1–20 gr.
 " citrate, 1–20 gr.
 " hydrobromate, 1–20
 gr.
 " hydrochlorate, 1–20
 gr.
 " iodide, 1–5 gr.
 " phosphate, 1–20 gr.
 " salicylate, 2–30 gr.
 " sulphate, 2–30 gr.
 " tannate, 2–5 gr.
 " valerianate, 1–3 gr.
 Resorcine, 3–10 gr.
 Rhamnus, purshiana, 15–60 gr.
 Rhubarb, 5–30 gr.
 Rhustoxicodendron, 1–5 gr.
 Rumex, $\frac{1}{4}$ –1 dr.

Savine, 5–20 gr.
 Salicine, 5–30 gr.
 Salipyrin, 10–25 gr.
 Salol, 3–15 gr.
 Salophen, 5–15 gr.
 Sanguinaria, 2–30 gr.
 Sanguinarine, $\frac{1}{2}$ –2 gr.
 " nitrate,— $\frac{1}{8}$ gr.
 Santonine, $\frac{1}{4}$ –2 gr.
 Scoparius, 15–60 gr.
 Scilla, 1–3 gr.
 Scillitoxin, $\frac{1}{10}$ gr.
 Senega, 10–20 gr.
 Senna, 15–120 gr.
 Serpentaria, 10–30 gr.
 Soap (U. S. P.), 5–30.
 Sodium acetate, 10–40 gr.
 " arsenate, $\frac{1}{2}$ – $\frac{1}{8}$ gr.
 " benzoate, 10–60 gr.
 " bicarbonate, 10–60 gr.
 " bromide, 10–60 gr.
 " carbonate, 5–15 gr.
 " citrate, 5–15 gr.
 " hypophosphite, 5–20
 gr.
 " iodide, 5–60 gr.
 " nitrate, 10–30 gr.
 " phosphate, 15–240 gr.
 " salicylate, 5–60 gr.
 " sulphate, 1–8 dr.
 " sulphate dried, $\frac{1}{2}$ –4 dr.
 " sulphite, 10–60 gr.
 Sparteine sulphate, $\frac{1}{10}$ – $\frac{1}{2}$ gr.
 Spigelia, 15–120 gr.
 Stillingia, 15–60 gr.
 Stramonium leaves, 1–5 gr.
 " seed, 1–3 gr.
 Strontium bromide, }
 " iodide } 5–10 gr.
 " lactate }
 Strophanthin, $\frac{1}{1000}$ – $\frac{1}{500}$ gr.
 Strychnine and salts, $\frac{1}{10}$
 gr.
 Sulfonal, 5–30 gr.
 Sulphur, 15–90 gr.

Sumbul, 30-60 gr.	Uva Ursi, 15-60 gr.
Syrups—base dose on drug strength.	Valerian, 10-30 gr.
Tanzy, 15-60 gr.	Veratrin, $\frac{1}{8}$ - $\frac{1}{2}$ gr.
Taraxicum, 15-240 gr.	Veratrine, $\frac{1}{40}$ - $\frac{1}{10}$ gr.
Terebene, 3-10 min.	Veratrum viride, 1-5 gr.
Terebinthina Canadensis, 5-30 min.	Viburnum, 15-60 gr.
Terpine hydrate, 2-10 gr.	Wines—base dose on strength.
Thein, 1-3 gr.	Xanthoxylin, 1-2 gr.
Thiol, 2-10 gr.	Xanthoxylum, 5-30 gr.
Thymol, $\frac{1}{2}$ -2 gr.	Xylol, 10-40 gr.
Tinctures—base dose on percentage.	Zinc, Acetate, $\frac{1}{2}$ -2 gr.
Trillin, 2-4 gr.	Bromide, 1-2 gr.
Trionol, 5-20 gr.	Oxide, 1-5 gr.
Triticum, 1-8 dr.	Phosphide, $\frac{1}{18}$ - $\frac{1}{3}$ gr.
Urethane, 10-40 gr.	Sulphate, 1-3 gr.
	Sulpho Carbolate, 1-3 gr.
	Valerianate, $\frac{1}{2}$ -2 gr.

PART IV.

DISPENSING.

Classification of prescriptions.—There is no such thing as a complete, proper classification of prescriptions, but as regards consistency or form, we have medicines which when compounded are liquid, semi-liquid, semi-solid and solid.

Liquids are most often used, for various reasons, the two main ones being:

First—Liquid medicines generally act more promptly, being more quickly absorbed by the circulatory system.

Second—This form is also more convenient for the patient to take.

SOLUTIONS.

Liquid preparations may be either *solutions* or *mixtures*.

A solution is the product of the complete blending of the molecules of two or more substances, and may be said to be due to adhesion of the different molecules.

Solutions are simple, or chemical.

A simple solution is the result of the blending of either a liquid with another liquid, as the medi-

nal liquid carbolic acid containing 5 per cent water, which is added to prevent crystallization; or a solid in liquid, as "liquor potassa," containing 5 per cent potassium hydrate in water; or a solid with another solid, as chloral and camphor; or a gas dissolved in liquid, as aqua ammonia, which contains 10 per cent ammonia gas dissolved in water. In the case of solids dissolved in liquids, solution is assisted by having the solid in a finely granulated condition, by using the solvent at an elevated temperature, and by trituration or otherwise agitating the mixture so as to expose the solid to succeeding fresh portions of the solvent.

In the case of a liquid with another liquid, sometimes they will blend in any proportion by mere mechanical mixture, as the solution of glycerine in alcohol or water. In the case of carbolic acid and water, temperature determines, to a great extent, the solubility of the acid; a small portion is soluble in cold water, and an increasing amount as temperature is raised, up to the boiling point, where any amount will dissolve; however, if an equal part of glycerine be thoroughly mixed with the carbolic acid, it can be dissolved in almost any proportion of cold water and a clear solution will remain.

In case of a solid with another solid, the elevation of temperature facilitates solution, but the addition of a few drops of certain other substances hastens solution to a marked degree. A few drops of chloroform added to a mixture of camphor and chloral causes solution almost immediately.

With the solution of a gas in a liquid, the absence of heat is the first condition; pressure is necessary to get a saturated solution of a gas in liquid for the reason that both pressure and cold tend to condense the gas, and of course the more condensed or con-

centrated in form the substance to be dissolved is, the more concentrated will be the solution.

Prescriptions containing a solution of gas should be well corked always; strong solutions should have the stopper of the bottle tied to prevent its being blown out when in a warm place, the pressure being increased by heat which causes expansion.

Certain solid substances may be perfectly insoluble in a liquid, yet by the adding to that liquid of certain other substances the article will be freely soluble; as an example, take mercuric iodide, it is insoluble in water, but a little concentrated solution of potassium or sodium iodide will render it freely soluble. Solutions of this kind are sometimes called compound solutions, but there is no more reason for calling this "compound" than there is for calling the solution of carbolic acid in water, by the aid of glycerine, a compound solution. There are cases of a liquid soluble in another liquid but not vice versa in the same proportion. Water dissolves 10 per cent ether—ether 3 per cent water; oil of peppermint dissolves up to 900 per cent of alcohol, but alcohol will not dissolve oil of peppermint perfectly; an opaque cloudy solution is the result of trying to cheapen the spirit which the Pharmacopœia directs to be of 10 per cent strength. When a solvent has dissolved all of a substance it is capable of dissolving, it is called a saturated solution.

When a prescription calls for a saturated solution, the solvent should be saturated with the substance at 15 degrees C. (59 degrees F.), the usual temperature of a dwelling house. A solution saturated above this point is a super-saturated solution and on cooling, part of the dissolved substance will crystallize out.

Care should be taken not to use heat where there

is liable to be decomposition, as with the bicarbonates, chloral, etc.

Where simple solutions are to be prepared by dissolving a substance in a liquid, put the liquid in the container and add the substance to be dissolved, instead of putting in the substance and pouring the liquid on top of it.

Where there is a strong solution to be made, or where a very light substance is to be dissolved in a liquid, triturate in a mortar until solution is effected. As a rule never use heat unless it is necessary and only when there is no danger to the balance of the product, from heat. As a rule it is better not to dispense a preparation with crystals undissolved remaining in the bottle.

Percentage Solutions.—

Solutions are sometimes prescribed of a definite strength, usually of a certain percentage. The proper way to prepare such solutions is to weigh the substance to be dissolved and add the solvent in sufficient amount to measure the amount of the finished solution; for instance:

R Sol. Sodii Chloridi $\frac{6}{100}$ % I.L.

S. For transfusion.

To prepare, weigh 6 Gm. sodium chloride, add to distilled water to make 1000 Cc. or 1 Liter. Such a solution should be sterilized. Sterilization is effected by boiling and stoppering so as to prevent the solution coming in contact with the air, which is liable to contain germs. Boiling destroys the germs present in the solution.

Example:

R Solutio Cocainæ Hydrochlorat. 5%, 10 Cc.

S. Use as directed.

To prepare the above solution, weigh five deci-

grammes of hydrochlorate of cocaine and add to water enough to make 10 Cc. of finished solution. This method, it is claimed by some, is not technically correct on account of the finished solution containing more than 100 per cent or twenty times the weight of the cocaine. Technically, perhaps all percentage solutions should be prepared by weight; however to *use* a percentage solution prepared by weight would involve the necessity of *administering* also by weight—something entirely impractical. Hence for practical use weigh the substance, measure the solvent and you know the exact amount in any measured dose of the liquid; this is rendered necessary on account of the difference in specific gravity of different solvents and different specific gravity of solutions of different strengths made with the same solvent.

A chemical solution is a solution effected by adding a solvent which combines chemically, forming a soluble compound with the substance to be dissolved.

Quinine is sparingly soluble in water, but a few drops of sulphuric acid will render the solution clear by forming bisulphate of quinine which is freely soluble.

Lead Acetate will not make a clear solution with ordinary water no matter how pure the chemical or water be, on account of lead carbonate being formed by the carbon dioxide which is absorbed by the water. In preparing such solution always boil the water to expel the gas before adding the lead acetate.

Sometimes (though rarely admissible) a few drops of acetic acid may be added to dissolve any carbonate thus formed, but care must be taken not to have

a solution containing free acetic acid as it will irritate the surface to which applied.

When a prescription is to be prepared calling for substances which will produce a precipitate and the precipitate is not the remedial agent, it should be filtered—especially eye waters, sprays for the nasal passages, throat, etc.

Sometimes, however, the precipitate is the object sought by the physician. In such case it should be allowed to remain and the ingredients mixed in such a way as to produce the precipitate in as finely divided condition as possible. This can be accomplished in various ways. Cold will aid the formation of a fine light precipitate. Viscid, saccharine, or mucilaginous substances, or glycerine, will “protect” the weaker salt and retard reaction, causing a fine light precipitate to form, and will also tend to hold it in suspension in the liquid.

Example:

R	Zinci Sulphatis.....	℥ j.
	Plumbi Acetatis.....	℥ j.
	Glycerina.....	f℥ j.
	Aqua	f℥ v.

M. Signa. Apply on lint.

The above prescription should be prepared by dissolving the sulphate of zinc in about two ounces of water—the other three ounces of water mixed with the glycerine will dissolve the lead salt—add the zinc sulphate solution gradually, stirring constantly, a light fine smooth precipitate of lead sulphate is formed. This should be dispensed with a shake label.

When a precipitate will result from the combination of two chemical agents—never put the ingredients together dry and add the liquid afterwards.

By careful observation while dispensing prescriptions of this nature, experience can be gained which will be of more value to the dispenser than anything that can be learned from a book.

Compound Solvents.—

Some substances are soluble in water or ordinary solvents to a limited extent, or they may be almost insoluble therein and yet are perfectly soluble in a solution of another substance, without the interchange of molecules, or without chemical reaction. These substances when used as solvents may be called auxiliary solvents or compound solvents. Below we give a list of substances which are soluble to only a limited extent in water, with corresponding auxiliary solvents, by the use of which a more or less concentrated solution may be easily effected.

SUBSTANCE.	SOLVENT.
Acid Arsenous.....	Weak acids.
Acid Benzoic.....	Sodium Benzoate, Sodium Phosphate, Sodium Sulphate.
Acid Boric.....	Borax, Hydrochloric acid, Glycerine, Syrup.
Acid Gallic.....	Potassium Citrate.
Acid Salicylic.....	Borax.
Bismuth Citrate.....	Ammonia water.
Bismuth Subcarbonate..	Ammonium Carbonate.
Borates	Boric acid.
Borax	Sugar (increases the solubility).
Bromine	Potassium Bromide.
Calcium Hydrate	Sugar.
Calcium Phosphate	Acids, Ammonium Chloride.
Chrysarobin	Alkalies.
Citrates	Sodium, Potassium, or Ammonium Citrate.
Cotton	Ammonio-Sulphate of Copper.
Iodine.....	Potassium Iodide.
Iron Subcarbonate.....	Sugar.

Iron Oxalate	Oxalic Acid and other acids.
Iron Oxide and Hydroxide	Sugar.
Iron Phosphate, Pyrophosphate, and Tartrate	Alkaline Citrates and Tartrates.
Mercury Bichloride.....	Ammonium Chloride, Sodium Chloride.
Mercury Biniodide.....	Potassium Iodide, Sodium Thiosulphate.
Mercury Sulphate.....	Potassium Sulphate.
Mercur-Ammonium Chloride.....	Ammonium Acetate, Carbonate, or Nitrate.
Pepsin	Hydrochloric acid.
Phosphates	Alkaline Phosphates.
Potassium Bitartrate....	Borax and Alkalies.
Pyrophosphates	Alkaline Pyrophosphates.
Silver Cyanide.....	Potassium Cyanide, Sodium Thiosulphate, Ammonia.
Silver Iodide.....	Potassium Cyanide, Alkaline Iodides.
Tartarates	Tartaric Acid and Caustic Alkalies.
Zinc Carbonate	Ammonia water.
Zinc Oxide	Ammonium Carbonate.

MIXTURES.

The term *mixture* will be used here to embrace mixtures proper and *emulsions*.

Mixtures are preparations compounded of two or more liquids insoluble in, or immiscible with each other; or of a liquid containing one or more solids; the solids are usually more or less suspended in the liquid, but tend to subside when at rest. Such mixtures are often the result of improperly compounding preparations which would be clear solutions if the ingredients were combined in the proper proportion and manner.

Incompatibilities are often to be met with and can be guarded against, and often successfully overcome by using presence of mind with knowledge of such

pharmaceutical incompatibility and a general knowledge of the properties of medicines; there are no absolute rules, however a few general principles may be observed.

Concentrated syrups or mucilages should not be mixed immediately with strong alcoholic liquid; dilute them with other ingredients if possible.

Essential oils should be dissolved in strong alcohol before mixing with aqueous liquids, as in liniments, etc.

Tinctures, Fluid Extracts, etc., when of different alcoholic strength should be mixed carefully; when it is necessary to mix them with water, add the water gradually to the alcoholic liquid instead of vice versa, precipitation may be avoided; if a precipitate does form, it will not be so heavy or magma-like as by reversing the order of mixing.

In mixing tinctures or fluid extracts when of different alcoholic strength, add the weaker to the stronger gradually with stirring or agitation.

Mixtures should always be directed to be shaken before being administered.

Examples of mixtures.--

℞	Morphine Sulphatis.....	.10	Gm.
	Bismuthi Subnitratis.....	1.	Gm.
	Aquæ Anisi.....	20.	Cc.
	Syrupi ad.....	32.	Cc.
℞	Tinct. Benz. Co.....	two	drachms.
	Liq. Morph.....	one	ounce.
	Mucil. Acacia.....	half an	ounce.
	Aqua	two	drachms.

Misce.

In this case, if you add water to the tincture, the benzoin is all precipitated and rises to the surface,

and it is impossible to mix it, but just shake the tincture well with the mucilage, then add the water, gradually, and you get a nice mixture.

	Gm.	Cc.
℞ Quininæ Sulphatis.....	2.	
Strychninæ.....	.015	
Acid Sul. Ar.....	1.5	
Syrupi ad.....	120.	
℞ Pulv. Calamine.....	gr. xl	
Zinci Ox.....	3i	
Glycerini	m xv	
Aq. Rosæ.....	℥ i	
℞ Ol. amygd. dulc.....	℥ iii	
Spts. Odoratus ad.....	℥ iii	
M.		
℞ Quin. Sulph.....	gr. xxiv	
Syr. Glycyrrh.....	℥ iii	
M.		

EMULSIONS.

Definition.—

An *emulsion* is an intimate, more or less permanent, mixture of a substance (either liquid or solid) with a liquid, in which the substance is insoluble; the mixture being facilitated and suspension effected by means of a third substance or emulsifying agent. Thus we see that although the term emulsion is usually understood to mean a mixture of oil suspended in water, it may be used to signify a mixture of any liquid immiscible with or insoluble in water, or an insoluble powder with water and the proper emulsifying agent, when properly prepared.

Emulsifying agents proper are either gummy or

albuminous substances or both; soaps and alkalies are sometimes used, but we doubt the propriety of classing them with the emulsifying agents. They are agents with decided tendencies to chemical action, and they consequently often, if not always, change the chemical identity or medicinal effects, or both, of the remedy to be emulsified.

Albuminous substances are entitled to first place in the list of emulsifiers, being used in nature as milk and in yolk of egg, and also in vegetable economy; their value can be readily judged as nature uses the best of everything. They will emulsify a greater number of different substances and make better and more agreeable emulsions both to sight and taste than gums or any other emulsifiers; however, they do not keep long unless artificial means be employed.

Gums will make emulsions which will keep longer; they, too, can be used for most all *practical* purposes.

The theory and practice of making an emulsion is:

First: Breaking up the substance to be emulsified into very fine particles.

Second: Coating the divided particles with gum or albuminous matter, so that adhesion of substance, agent, and diluent will overcome the cohesion of the substance, prevent coalescing of the divided particles, and ensure a more or less permanent homogeneous mixture. This form of medicine is used to disguise the taste and odor, and render palatable, remedies which otherwise are objectionable. When properly prepared they aid assimilation of the remedy.

It is often necessary to flavor emulsions; usually essential oils are used, and when used they should be mixed with the basis first and emulsified along with it.

To prepare an emulsion properly two precautions are necessary:

First: Use the proper proportion of agent.

Second: Use proper manipulation; "too much of a good thing is worse than none" is illustrated well in making emulsions. Do not use too much of the emulsifying agent; do not use too much agitation; if, after using correct proportions and having stirred or agitated rapidly two or three minutes you don't succeed in getting an emulsion, try again with a fresh portion of drug.

Procedure.—To make an emulsion it is first necessary to get a *nucleus* or *primary emulsion*. To make a primary emulsion, it is most practical to use acacia, one part to four parts fixed oil—or, one part to two parts volatile oil, using twice as much water as gum in each case. Put the gum into a shallow, rough mortar which will hold three or four times the finished product; add the oil and triturate to an even, smooth mixture, then measure in a separate graduate the water, and add all at once; stir in one direction rapidly until a smooth creamy mixture, or nucleus is obtained; then add the balance of the vehicle in small portions stirring constantly. If alcoholic liquids, such as tinctures or fluid extracts, or solutions of salts, alkalies or acids are to be added, let them be added last and in small amounts, having been previously diluted slightly, if too concentrated.

A **nucleus** or primary emulsion *cannot* be made *successfully* with syrup, acid, alkali nor salt solutions *in place of water*; let them be added last if at all. If *mucilage* of acacia is to be used, pour into a dry mortar and add the oil in small portions, completely emulsifying each amount before adding more.

As mucilage of acacia is very prone to fermenta-

tion, it being almost impossible to keep it for any length of time, and as it is very essential that it be strictly fresh, the stock mucilage is not a desirable agent to use in making emulsions; it is best made as needed, 34 grammes of pure granulated acacia added to enough water to make 100 Cc. and triturated or shaken in a clean bottle to solution.

Tragacanth is unlike acacia in point of solubility; a small part of it is soluble and forms a very tenacious mucilage; the portion which is insoluble (bossorin) swells enormously and forms with the mucilage proper a very stiff paste, which is useful to prevent oil from separating from the emulsion. It is not so good an emulsifier as acacia but when used with it a good emulsion is made with less cost; it will prevent separation, and coalescing of the particles of oil much longer than acacia, and is very advantageously employed to keep powders in suspension; it will hold in suspension about forty times its weight of fixed oil, or twenty times its weight of volatile oil, perfectly; the objection to its use is that it makes a very thick emulsion which does not look well.

Irish moss is used a great deal of late, usually in combination with other agents, as a cheapener; this is not a good recommendation to the prescription druggist; it spoils quickly unless antiseptics be combined with it; they may be objectionable—so the use of it in the prescription case is seldom warranted.

Quince seed mucilage is sometimes used, but is not of any particular importance.

Almonds are used to some extent, but usually only to emulsify the oil contained therein, and according to the Pharmacopœia this requires acacia also.

Gum-resins make good emulsions when clear fresh pieces are triturated with water (best luke-

warm) added in small portions; no other emulsifying agent is required; they cannot be used as emulsifying agents.

In making a gum-resin emulsion the powder will not answer, it being made from cullings or "sorts" and injured by heat in drying, preparatory to powdering. To powder gum resins use a chilled mortar and pestle and operate in a cold temperature, on small portions of the drug

Yolk of egg can be used for almost any emulsifiable body, but is prone to spoil; therefore its use is restricted to prescriptions for immediate use (in two or three days), and those containing antiseptic agents, like chloroform, creasote, terebene, eucalyptol, etc.; it can be used in varying proportions from 20 per cent to 50 per cent; it is best used in the form of *Glyceritum Vitelli* U. S. P.

Milk is best used in condensed form, diluted first with an equal amount of water. The oil should be added to the milk in small portions, trituration being kept up constantly. One ounce of condensed milk and one ounce of water can be made to emulsify $12\frac{1}{2}$ ounces of fixed oil, making a $14\frac{1}{2}$ ounce emulsion 84 per cent; this would be too thick for practical purposes. Fifty per cent emulsions can be easily and quickly prepared by taking 25 per cent milk and 25 per cent water, and properly adding oil, 50 per cent.

The objections to both egg-yolk and milk is, that emulsions so made do not keep long.

Emulsions, with either milk or egg-yolk, should not be combined with tannin or strong acids.

White of egg, or egg albumen, is used also, but has no special value, being inferior to gums, yolk of egg, and milk. When directed by the physician

it should be first well beaten, then add the substance to be emulsified, mix well, and add the water last.

Tincture of quillaya bark is used as an intermediate or emulsifier, and will facilitate the emulsification of a large number of refractory substances. It is objectionable, on account of being acrid and irritating to the mucous membrane of the alimentary canal. The virtue of quillaya depends on saponin, which is present also in senega and some other drugs.

To prepare an emulsion with tincture quillaya, put it in a bottle, add the oil in portions, shake violently; 1 part will emulsify 6 or 8 parts of fixed oil, but not nearly so much volatile oil; some volatile oils require as much as equal parts tincture quillaya.

Tr. quillaya is useful where free acids are prescribed, being compatible with acids, while gums and other emulsifying agents are incompatible with acids as a rule.

Alkalies form soaps, not emulsions, with oils.

Soap is decomposed by water, liberating the acid of the soap and an alkaline principle or body which saponifies (but does not emulsify) more oil.

Balsam copaiba can be saponified with alkali; the result of such a combination, while strictly speaking it is not an emulsion, is often used and is compatible therapeutically, the action of the alkali also being desired.

Examples of emulsions.—

	Cc.
R Pepto Mangan "Gude's".....	60
Ol. Morrhuæ.....	60
Ft. Emulsio ad	150

The following prescription is often met with:

℞ Ol. ricini.....
Sacchari.....
Mucil. Acaciæ..... aa3ii
Aqua..... 3i
Ol. menth. pip. gtt. ij.
M. ft. Emulsio.

This is best mixed in a mortar; rub the oil of peppermint with the sugar, add the mucilage and a little water, then the oil, and when these are mixed the remainder of the water gradually; you will then have a nice looking mixture, without any globules of oil floating about. Always take care that the mucilage and oil are well mixed in this kind of a mixture before the water is added, or you will have drops of oil floating about, or should any tincture or spirit form part of the ingredients, mix it with a little of the water, and let it be added last, or you may possibly find the mixture come "unmixed," for gum is precipitated from its solution by spirit; do not forget that the oil is to be added to the mucilage, *not the mucilage to the oil*.

℞ Ol. Gaultheriæ..... 3i.
Acacia..... 3i.
Aqua q. s..... 3iii.
M. ft. Emulsio.

Emulsions of most volatile oils can be made as follows: One ounce of oil is placed in an eight-ounce bottle, one-half ounce of powdered acacia is added, and the bottle shaken well; then add sufficient water to make eight ounces. The emulsion is completed by a thorough shaking.

Examples of emulsions (or soaps?) prepared by use of an alkali.

℞ Potass. Carb..... four drachms.
 Syrup Tolu..... one drachm.
 Oleum Amygd..... two drachms.
 Aqua three ounces.

The carbonate of potash should be dissolved in about two ounces of water, the syrup and oil added and well shaken, then add the remainder of the water.

℞ Copaiba Bal..... ℥ss.
 Liq. Potassæ..... ℥ii.
 Aqua ad..... ℥iv.
 M. ft. Emulsio.

℞ Chloroformi..... 3i.
 Glyceritum Vitelli q. s.....
 Aqua ad..... ℥i.
 M. ft. Emulsio.

℞ Guaiacol }
 Terebene } aa..... 3i.
 Ovum vitelli..... i.
 Aqua ad..... ℥iii.
 M. ft. Emulsio.

℞ Ol. Morrhuæ..... ℥ii.
 Tr. Quillaya.....
 Aqua aa. ad..... ℥iv.
 M. ft. Emulsio.
 S. 50% C. L. O. emulsion.

SEMI-LIQUIDS OR SEMI-SOLIDS.

As the terms indicate, these preparations come between liquids and solids and grade, one into the other. They include:

- | | |
|------------------|-----------------|
| 1. Poultices. | 6. Electuaries. |
| 2. Fomentations. | 6. Jellies. |
| 3. Plasmas. | 7. Ointments. |
| 4. Pastes. | 8. Salves. |
| 5. Confections. | 9. Cerates. |
| a. Conserves. | 10. Pomades. |

1. A poultice is a soft preparation composed usually of farinaceous matter incorporated into a mush or stiff batter, with hot water or watery medicinal matter, and is intended to be spread on cloth and used while hot; it is usually applied direct to the skin and covered on the outside with oiled silk or impervious cloth to retain the heat and moisture as long as possible. It should be applied to the body as hot as can be borne by the back of the hand.

The druggist seldom prepares poultices entirely, but is often required to prepare the mealy base and mix other medicines with it and give directions to the customer for further preparation or completion.

Linseed poultice may serve as a type; the proportion of water does not matter so much but should be judged with each poultice, adding enough in each case to make a thin mush; usually about $2\frac{1}{2}$ parts of water to one part of base is sufficient; incorporation should be effected as quickly as possible to avoid loss of heat. An exception to this rule is mustard poultice, which must be prepared with water at 100° F. so as to avoid injury to the mustard, the virtue of which as a poultice depends on the rubefacient action of a volatile substance (Allyl iso-

sulpho-cyanate) which is generated in the mustard in the presence of lukewarm water; it is not formed, or if formed is dissipated by heat.

Mustard is also an exception to the rule of applying directly to the body, a thin loosely woven cloth being placed between the body and the poultice to prevent staining.

Mustard is usually mixed with an equal amount of flour which gives body and consistency to the poultice, diluting the mustard and at the same time modifying its action slightly.

2. Fomentations are poultices composed of herbs or, non-absorptive material and hot medicinal liquids or lotions. These preparations are to be applied while hot as can be borne by the skin.

3. Plasmas are non-fatty preparations used as substitutes for fatty ointment bases.

They are glycerine jellies, being made by adding starch, gelatine, etc., to a mixture of glycerine and water in proportions sufficient to render them of the same consistency as ointments.

At least 25 per cent water should be added to the glycerine to prevent its irritating action, as pure glycerine abstracts water from the skin. A certain firm put upon the market several years ago a class of preparations of this nature under the name of gelatole-ointments. As yet they have not displaced ointments from "business at the old stand."

4. Pastes are preparations containing caustic or escharotic chemical agents, made into a paste with flour, starch or a similar vehicle and water. They are little used at present.

When prepared, care should be taken not to get them too soft, for as a rule they are deliquescent and this precaution is necessary to prevent them from spreading. The most common are mixtures

of lime and soda, lime and potassa, arsenic and creasote, sulphate of copper, and chloride of zinc.

5. Confections are saccharine, flavored pastes, and may consist either of conserves or electuaries.

The difference between a conserve and an electuary is that a conserve is a paste made by beating the fresh drug with sugar, to preserve and sweeten it, and gum (if necessary) to bind and hold the particles together; while an electuary is such a preparation of a *dried* drug, made by using, usually honey, glycerine or mucilage with the sugar as an excipient. These preparations are used very little, except as excipients; the most common are conserve of tamarind, confection of rose, and confection of senna, the two latter being pharmacopœial preparations.

6. Jellies are, as the name implies, gelatinous, generally translucent substances, and include medicines for both internal and external use. The latter are used mostly as bases for applying other medicines and are called plasmas; they are opaque as a rule. Jellies proper are usually employed as excipients by which to administer fixed oils; they serve admirably, by covering or masking the taste and preventing the oil from adhering to the mouth.

Isinglass or gelatine is usually employed for this purpose, about 5 parts gelatine to 95 per cent water being the proportion. The gelatine or isinglass should be dissolved in two-thirds of the water, warm; the oil, water, sugar, and flavoring all previously mixed should be stirred in until uniformly mixed. The mixture should be allowed perfect rest to facilitate solidification while cooling.

For administering aqueous or alcoholic preparations, insoluble powders, etc., salep, starch, tragacanth, or Irish moss may be used.

7. Salves. - As usually employed the term salve is synonymous with ointment.

More properly it is used to designate a *bland* ointment used for applying to a fresh cut or wound.

8. Ointments are fatty preparations of such consistency that they may be spread upon the skin and will gradually liquify when in contact therewith; they consist of base alone when used to protect an irritated skin, or base and a medicinal agent.

The most common of the bases are lard, lard and wax, lanoline, petrolatum and a mixture of oil and wax; various proprietary bases are also on the market (each having most decided advantages over all others?).

The lard used should consist of only pure *leaf* lard and should be fresh and free from rancidity; *rancid lard is unfit for an ointment as it is irritating*, and incompatible with certain chemical agents.

Benzoic acid and benzoin are used to preserve lard from becoming rancid; moisture tends to aid its decomposition.

It is often desirable in ointments, to have water present, as the water evaporating absorbs latent heat, thereby producing a cooling sensation to inflamed, feverish or irritated surfaces.

When soluble salts are to be incorporated into ointments they should if possible be dissolved; if lard is used and the proportion of salt not too large, it should be dissolved in water and the solution incorporated. About 15 per cent pure water can be incorporated with lard.

Lard will not emulsify so much of a solution of a salt as it will of pure water.

A mixture of lard and wax is better suited for use in *hot weather* as the wax gives body and also acts as a preservative.

Lanoline is the proprietary name for wool-fat and is used quite extensively; it is the most readily absorbed of all the ointment bases and also will take up or emulsify more water than any other base. The commercial wool-fat or lanoline, contains about 30 parts of water in a hundred, but can be made to mix with an equal weight or even more of water; this property together with its capability of being absorbed readily, and also the fact that it is quite stable, renders it a very desirable ointment base both pharmaceutically and medicinally.

Petrolatum (vaseline, cosmoline etc.) is the agent best suited as an emollient protective; it is quite stable, not being oxidized by air, heat, moisture etc.; if pure, it is perfectly bland and inactive; the impurities when present consist of acids or bleaching agents used in its manufacture.

It will combine with only a very small portion of water, about 4 per cent. If 5 per cent castor oil is added, 10 per cent water can be incorporated with the mixture.

Goose oil with about 15 per cent cacao butter makes a very good ointment base, being quite readily absorbed; it has a strong odor which distinguishes it. It is often adulterated with lard oil and cottonseed oil.

Ointments may be prepared by mixing on a tile or triturating in a mortar when an insoluble substance is used, or by fusion or stirring when the ingredients are soluble in the melted oily base, or where wax, resin, lead plaster, etc., are constituents of the ointment and where insoluble substances are to be incorporated into the ointment; care must be exercised that the substances be in as finely divided condition as possible.

The substance should be mixed first with a small

portion of the base and thoroughly incorporated, then the balance of the base should be added gradually.

Solid extracts should be softened with water, dilute alcohol, alcohol or whatever is the best solvent before mixing with base. An ointment containing grit should never be dispensed.

Ointments made by fusion and incorporation require to be stirred until solidification begins, to prevent separation of the medicine and when wax and lard, or wax and oil bases are used, to prevent the wax from solidifying first, and separating.

9. Cerates (cera-wax) are preparations similar to ointments, usually containing wax in sufficient proportion to render them slightly firmer than ointments.

10. Pomades are perfumed ointments or cerates. The term is also used to designate a fat saturated by absorption, with the odor of flowers, used in the manufacture of perfumes.

MEDICINES WHICH ARE SOLID IN FORM.

Under this classification will be mentioned:

- | | |
|-------------------|-----------------------|
| 1. Powders. | (b) Boli. |
| (a) Papers. | (c) Parvules. |
| (b) Capsules. | (d) Granules. |
| (c) Wafers. | (e) Aggregations. |
| (d) Cachets. | (f) Capsules. |
| (e) Species. | |
| 2. Lozenges. | 4. Suppositories. |
| (a) Troches. | (a) Rectal. |
| (b) Globules. | (b) Vaginal. |
| (c) Pastilles. | (c) Urethral. |
| (d) Tablets. | (d) Nasal. |
| | (e) Aural. |
| 3. Pills. | 5. Plasters. |
| (a) Pills proper. | 6. Cotton and gauzes. |

1. Powders are by far the most convenient, and the form most often used to administer insoluble drugs, and some others whose effects depend upon the extent to which the particles are divided.

A. Papers.—Chartula is the term used when the powder is desired to be divided into doses, each dose wrapped in a separate paper and all enclosed in a box upon which directions are placed. Care should be exercised that the doses be equally divided—the powder having been thoroughly mixed by trituration, when more than one ingredient has been used. In the case of deliquescent powders, the paper after being folded should be carefully wrapped in wax paper. Do not put the powder in waxed paper direct, wrap in plain white paper first.

B. Capsules are specified instead of papers when the drug has a very disagreeable taste, they are very extensively used; the filling of them is apparently a very simple matter but unless care is used particles of the drug will adhere to the outside, and render them very nauseating or disagreeable to the patient; there are on the market machines or devices for filling dry, empty capsules, but they are not a very great success, unless it be in the saving of time. Capsules should be rubbed with a towel, or piece of cotton flannel, to remove adhering powder from the outside.

C. Wafers.—Some people imagine they cannot swallow a pill or capsule, but swallow wafers without difficulty.

Wafers are prepared by folding the powder or medicine in a moistened sheet (about $2\frac{1}{2}$ inches square) of wafer paper; these are prepared by baking thin batter made of rice-flour, or starch and gum arabic on hot plates. Wafers have to a great extent been displaced by

D. Cachets.—These consist of a powder placed and sealed within two small concave sheets of wafer paper placed with the concave sides together; the edges are moistened on a wet felt, or blotter, and pressed together; when administered the cachet is dipped in water, and is then easily swallowed.

E. Species.—"Teas" are powders consisting of coarsely ground or bruised drugs, intended to be used by the patient to make a decoction or an infusion.

2. Lozenges are flat, round, rectangular or square discs of sugar, containing medicinal matter, and are intended to be dissolved in the mouth.

A. Troches are lozenges made of the medicine, sugar and gum made into a dough with honey or syrup, the dough being rolled thin and cut into troches with a die of convenient or suitable shape, and then dried. Troches are seldom made on a small scale at present.

B. Globules are half globes or hemispheres, medicated by dropping upon them the medicine to be administered; the sugar absorbs the medicine, which must not consist of water or any sugar solvent. Globules are used in homeopathic pharmacy and are medicated with "tinctures" of various strength; grape sugar and sugar of milk are used to make the globules or "cones."

C. Pastilles are lozenges in which either chocolate or a mixture of gelatine and glycerine is used for a base; these preparations are usually made on a large scale.

D. Tablets are called compressed tablets, or tablet triturates, according to their form, size and mode of preparation.

Those called compressed tablets are larger, lozenge form or formed like discs, and are made from granular or granulated powders by a machine which compresses a certain amount of powder into a tablet, by means of a piston fitting into a die.

They vary in size but weigh usually from 3 to 20 or 25 grains.

Tablet triturates are smaller than compressed tablets, and usually made from triturates or medicines diluted by trituration with sugar of milk or a suitable diluent; they are made by machinery and are used very extensively; happily their use is on the wane, although it seemed a few years ago that they would annihilate the drug business; certain firms in

more or less disrepute with the profession sent men broadcast over the country, supplying physicians with every imaginable drug and combination, and urged the physicians to buy direct from them and use tablet triturates for everything; but this style of business was checkmated by a prominent Detroit firm cutting the price on t.t. to a "freeze out" figure.

PILLS.

Definition.—Pills are small, globular, ovoid or double-convex bodies of medicinal matter intended for internal administration. The word pill is derived from the Latin word "Pilum" meaning a "ball"; the diminutive "pilula," meaning "a little ball," is the term used in prescribing for pills.

General Remarks.—Pills form the most important class of preparations demanding the attention of the druggist. Medicines are administered in the form of pills for the purpose of making them agreeable to the taste, and also to facilitate concentrated dosage,

Very bulky medicines, liquids, very soluble medicines and those which exercise an irritating effect on the membrane of the stomach are usually not suitable for administration in pill form. Any solid not of an irritating character, nor too bulky may be given in pill form; some liquids may be given in the form of pills also.

Knowledge of the special properties of each drug, judgment and dexterity, or "knack," in manipulation will enable the pharmacist to make into reasonably good pills a great variety of medicines, seemingly unsuited for preparation in this way.

To make pills it is first necessary to form the medicine into a *mass* of such consistency as will enable

the pill to be shaped and *retain its form*. This is effected by the use of a *pill excipient* or *massing agent*. Each class of drugs requires a different excipient, theoretically, and while there are more or less "general" excipients, they are all objectionable in some instance; practically it is best to select the excipient according to the nature of the drug, size of dose, and general exigencies.

Special care is to be taken in weighing the ingredients, for as a rule very potent drugs are used; next mix the ingredients thoroughly, choose the proper excipient or massing agent, knead the whole into a dough, roll into a cylinder, divide into the required number of equal parts and shape properly. Solid extracts are, or should be of proper consistency for making into pills. A pill mass should be plastic, and soft enough to be neaded, adhesive so as to not crumble, and yet firm enough to retain its shape, and so that it will not adhere to the fingers too much. To prevent sticking, lycopodium or some other conspergative is used; powdered licorice, powdered althæa and starch are each used with advantage in special cases.

Only the powdered, *peeled licorice* should be used for this purpose. The best kind of mortar for making pills is shallow, of wedgewood with a rounded bottom and pestle to fit; the handle of the pestle should be long and have a large head so as not to blister the palm. The exercise of muscular power is one of the best adjuncts to the making of a pill mass; thorough trituration lessens the amount of excipient necessary, and also insures proper mixing of the ingredients. A good pill mass when finished will not adhere to the sides of the mortar.

After forming the mass properly it is to be rolled with the hands into a ball, then rolled on a pill ma-

chine, or tile, with a spatula, the hand or the back of the pill cutter, into a cylinder of the length desired, and of a uniform diameter, after which it is divided or cut into as many particles as pills are desired. Nothing but practice will insure competency in rolling the pills, which should be evenly divided so that each pill will be of the same size.

Excipients.—The most common excipients are glucose, syrup, honey, glycerine, water, alcohol, oils, soap and water, tinctures of vegetable drugs used to make the pills, mucilage of acacia, mucilage of tragacanth, glycerite of starch, confection of rose, powdered extract of licorice, powdered licorice, powdered althaea, resin ointment, kaolin ointment, magnesia, flour, bread crumb, manna, wax, and solid extract of dandelion or gentian.

The choosing of the excipient depends upon the physical and chemical properties of the drug or mixture to be made into pills. The excipient should be inert or nearly enough so, to be harmless, and should tend to preserve the shape and consistency of the mass. A good excipient makes a mass as small in bulk as possible; pills should always be as small as it is consistent to make them.

Sometimes it is necessary to use more than one excipient to mass certain drugs, to dissolve or render plastic very bulky or granular drugs.

An excipient may be a dry solid, or a liquid; we have non-adhesive and adhesive excipients of each class. A liquid excipient should exercise a solvent power upon the drug, and if any gummy or adhesive principle be present in the drug, the excipient should be selected to develop this adhesive property; if such principle be not present then an adhesive agent is necessary. Not all solvents are good excipients when used alone.

Antipyrine is made into a good pill with glycerite of starch, or with powdered gum and water; argentic nitrate with kaolin ointment, sugar of milk, or manna; benzoic acid with Canada balsam, 1 drop to every 4 grains, or with glycerine, 1 drop to 5 grains; balsam of Peru with bread crumb or beeswax; calomel with manna and compound tragacanth powder; calcined magnesia should not be used with calomel; camphor, the gum having first been reduced to a very fine powder, may be worked up with castor oil and soap; camphor monobromata, with Canada balsam, 1 grain to 5, in a warm mortar; creasote and carbolic acid, with powdered althæa, 1 grain to each minim, and glycerine or mucilage. A firm pill may be formed with carbolic acid or creasote in the following proportions: Acid carbolic, 2; pulv. althæa, 3; glycerine, $\frac{1}{4}$. Another method is with powdered soap, 1, powdered licorice, 5, acid carbolic, 1; this, when properly worked, makes an excellent mass.

Cerium oxalate, with confection of roses; chloral hydrate with Canada balsam, $\frac{1}{2}$ grain to 5, or syrup and powdered tragacanth; copaiba balsam, when mixed with calcined magnesia and allowed to stand for a length of time forms a workable mass.

Essential oils, such as savin, cloves, etc., may be massed with calcined magnesia and powdered soap, or with calcium phosphate and soap; soap and powdered licorice also make a good base, 1 to 5; croton oil with bread crumb, magnesia, and soap, or powdered licorice and mucilage; extract canabis indica and other thin extracts may be massed with compound tragacanth powder and magnesia; hydrarg. c. creta with confection of rose; care should be taken not to work it too hard, or the mercury will separate from the chalk; pepsin with glycerite

of starch; potassium iodide, bromide, and other crystalline salts should be reduced to a very fine powder, and massed with a small quantity of licorice powder and a drop of water; potassium permanganate, with kaolin ointment or resin ointment, etc., decomposes when mixed with organic substances; quinine with glycerite starch, also a good pill is made with tartaric acid, 1 grain to every 10 grains of quinine, and a drop of water; tannic acid with glycerite of starch.

Classification.—Pills may be classified as:

- (a) Pills proper, when made to weigh from one to five grains.
- (b) Boli (singular bolus), made to weigh more than five grains.
- (c) Parvules, less than one grain, sugar coated, with coating colored pink or red.
- (d) Granules, sugar globules impregnated with a liquid medicine by absorption.

Concentric pills are made of successive layers of different medicines, each layer having a separate coating and composed of medicine of different therapeutic action, part to dissolve and be absorbed in the stomach, part in the intestines.

Pills are classed as to their ingredients into four groups, viz.:

1. Powders and extracts of vegetable drugs.
2. Resins, gum-resins, aloes.
3. Oils and oleo-resins, creasote, phenol, etc.
4. Drugs prone to chemical action.

Group 1. Ordinary powdered drugs are not very difficult to handle; they mass readily as a rule with the common excipients, such as glucose, syrup, glycerite of starch, etc. Solid extracts are sometimes ready to be rolled into pills, but

are usually dry and hard, or too soft; in the first instance they should be softened with the natural solvent or the menstruum used to prepare the extract. When too soft they may be "dried" with powdered *Althæa* or powdered licorice root.

Group 2. Aloes, resins and gum-resins, and such drugs as opium may easily be massed with compound decoction of aloes; alcohol may be used sometimes with good results; soap may be used where it is not incompatible with any of the other ingredients of the pill.

Group 3. This includes those drugs which are perhaps least used in pill form and most difficult to dispense as pills. Powdered soap, magnesia, carb. magnesia, wax, the vegetable powders, *althæa*, licorice and ext. licorice are used. Magnesia or magnesium carb. should be used only for the liquid balsams—they form chemical salts, but the salts so formed are not objectionable in case of *copaiba*, etc. Powdered *althæa* with a little gum and water to develop adhesiveness will answer for these pills; the only trouble with the *althæa* and excipients of its class is their bulk. If by their use a pill not too large, cannot be made, something else must be used. Soap is an excellent excipient in many instances, but is open to objections on account of its active alkaline nature. A paste of flour and wax will absorb and mass quite an amount of oil; wax is not very soluble in the stomach, and should be used only when necessary; about an equal weight of wax for volatile oils—half as much only is necessary for fixed oils.

Group 4. Including drugs prone to chemical change, requires more or less care in the select-

ing of the excipient, which should not be incompatible with the drug used and should also protect the drug from outside influences. Pills of this class should be coated when admissible; salts of silver should be massed with kaolin and resin cerate; permanganate of potassium may be treated the same as salts of silver; phosphorus should be coated with a resin after being massed with vegetable powders, the phosphorus having been previously dissolved in chloroform; the chloroform will evaporate while trituration is going on, and the coating should be applied as soon as possible.

To mask the taste of pills they are sometimes rolled into cylinders after being divided and enclosed in gelatine capsules—the capsule also preserves the pill from the oxidizing effect of the air, etc. Be careful not to get any of the medicine on the outside of the capsule; always wash the hands after making the pills and before enclosing in capsules.

Coating Pills.—Pills are coated for the purpose of masking their taste, preventing oxidization and retarding solution so that the pill may pass the stomach and be dissolved in the intestines. Pill coating is an art which can be practiced to very little advantage by the pharmacist, as, coated, ready-made pills can be had of nicer appearance and also at less cost than the pharmacist can produce them unless a great number are made at one time.

Gelatine Coating.—The following makes a good solution:

Gelatine..... one ounce.

Water seven ounces.

Dissolve at a gentle heat, then add the white of

an egg, and heat until the albumen coagulates, strain through a flannel into a water-bath kept at a low temperature, add two drachms glycerine, two drachms alcohol and six grains of boric acid.

A large, round cork can be brought into use by setting upright in it six or twelve needles and impaling upon the point of each, one of the pills which are now dipped into the warm solution, taking care not to keep them in too long, as a thick coating is not desired. After removing them from the solution they should be turned about in different directions to render the coating even, and then set aside to dry.

Gold or Silver Coating.—This is a very simple process and is accomplished by placing a drop or two of syrup of acacia in a mortar, and after distributing it well over the surface, the pills are put in and rotated so as to coat each one with a thin layer of the syrup, after which they are put into the coater with the gold or silver leaf and rotated gently until perfectly coated. A large round powder box will answer for a pill-coater.

Pills are coated on a large scale with sugar and gelatine almost exclusively. However, at the prescription counter it is not practical to apply these coatings. Instead are used "pearl coating," gold and silver leaf, and varnish, consisting of a resin dissolved in ether which evaporates, leaving the resin or coating dry and uniform in thickness, when it has been properly applied. A good pearl coating is composed of powdered sugar of milk 5 parts, acacia 1 part, talcum powder 2 parts; gold and silver leaf are not used except when ordered; pearl coating is applied in the same way as gold and silver coating. "Varnishes" are applied to a dry pill the same as

mucilage is applied preparatory to pearl coating, then allowed to dry, or else the varnish is made quite thin and sprayed on with an atomizer while the pills are revolved or shaken in a mortar or suitable container. Etheral solution of tolu, mastic, sandaric or mixtures of these, is used for this purpose. Salol may be used in the same manner as the varnishes; it is especially desirable for medicines which should pass the stomach and reach the intestines in a concentrated and unchanged form; twenty per cent solution in ether may be used, or salol may be melted at 112° F. and the pills rolled therein. Glycerine should not be employed as an excipient when salol coating is to be used, else the coating will not dry.

Examples of refractory pills:

R

Salol..... 3i.
 Ol Gaultheria..... Mxl.
 M. ft. pil..... No. xxx.
 Use 60 grains light carbonate magnesia.

R

Camphor..... 3i.
 Ft. pil..... No. xx.

Mass with castor oil, "finish" with powdered starch.

R

Potassii Permanganatis..... gr. xv.
 Ft. pil..... No. xv.

Mass with kaolin ointment.

R

Podophyllin..... gr. ii
 Aloe Socotrina..... gr. xxx
 M. ft. Pil..... No. x

Make mass with a few drops tr. aloes or comp. decoction aloes.

R

Chloral Hydrate..... gr. xxx

Make 6 pills.

Powder finely and mass with balsam fir.

R

Opil pulvis..... gr. x

Ext. Belladonnæ..... gr. ii

M. ft. Pil..... No. x

Triturate to mass, no excipient necessary.

R

Salolis.....

Copaiba.....

Oleo-res. Cub.....

Pepsinæ..... āāāi

M. ft. Pil. No. xxx; dispense in capsules.

Dissolve the salol in the oleo-resin, add the pepsin; mix 60 grains light carbonate magnesia and five drops of water with the copaiba, heat gently and let stand one or two hours, mix with other ingredients, add powdered althæa and a little water to form mass.

SUPPOSITORIES.

Definitions.—A suppository is a solid body, composed of or containing medicinal matter, which is to be introduced into the passages of the body to melt, and either be absorbed thence into the system or produce a local remedial action. There are according to their uses, Rectal, Vaginal, Urethral, Nasal, and Aural suppositories.

Vaginal suppositories are sometimes termed pessaries.

Urethral suppositories likewise are called bougies; both terms when so used are improper.

All suppositories should be of such consistency as to remain firm *below*, but melt readily *at* the body temperature, about 100° F. The use they are intended for determines their shape and size.

A. Rectal suppositories should weigh about 15 grains and be shaped like the bullet in a cartridge, cone shaped, with a blunt point.

B. Vaginal suppositories should be of the same shape, or globular, but weigh 30 to 60 grains.

C. Urethral suppositories should weigh about 15 grains, and be about 2 inches long and conical at one end.

D. Nasal suppositories weigh about 10 grains and are $\frac{1}{2}$ to $\frac{3}{4}$ inch long.

E. Aural or ear suppositories are nearly like the rectal, only the base is more extended; they should be about 5 grains in weight.

Rectal suppositories are by far the most common, as many medicines are given that way which are ordinarily given by the mouth; the effect is not produced so rapidly, except in the case of strychnine, and except strychnine, larger doses are required when drugs are administered in that way.

Cacao butter is the suppository base par-excellence; in extremely hot weather, or when much medicine of soft consistency is used, the melting point should be raised by adding a little wax or spermaceti, although these drugs retard absorption. In very cold weather vaseline or lanoline should be used to prevent crumbling. Pure cacao butter should be used when possible; curd soap with starch is used for glycerine suppositories.

Also a mixture of gelatine, 20 per cent, glycerine, 80 per cent may be used; the gelatine is softened with hot water, the glycerine added and the water evaporated. After the mixture has cooled sufficiently it is poured into molds. Neither soap nor gelatine should be used with metallic salts, tannin nor acids.

Suppositories should be preserved in a dry, cool place. Three methods are used in making them, viz.: casting, pressing and forming by hand. By the first method the medicine is mixed with the base, melted and cast in molds chilled by being immersed in ice water or a freezing mixture. There is now on the market a machine by which suppositories can be made very neat, quickly and of uniform size. The medicine is intimately mixed and massed with the base, the mixture is then placed in the cylinder of the machine, into which fits a plunger which is operated by a screw handle.

A small opening from the cylinder conveys the mass to a mold where the suppository is formed;

when the mold is full it is opened and the suppository drops out, large end first. The molds are made to make three or more suppositories at a time.

Perhaps the best, cheapest and quickest method, when only a small number is made, is to form the suppository by hand. The mass is made by triturating with a mortar and pestle, using grated cacao butter; when of proper consistence the mass is rolled into a cylinder and divided as in pill making; each piece is then formed with the fingers. Experience is necessary, but when once attained, particularly satisfactory suppositories can be made very rapidly, without the expense of a machine and the bothering with ice, freezing mixtures, etc.

Suppositories may be dispensed in a box with an impervious lining, or a little cotton sprinkled with lycopodium in the bottom and top of an ordinary powder box, will answer just as well. They should be labeled "keep in a cool place."

PLASTERS.

A plaster is a solid substance or compound, adhesive at the temperature of the body and requiring to be heated to be spread. They are made and spread by machinery almost exclusively now; their manufacture forming an independent business or industry.

The base of most plasters is oleate of lead, or the same combined with wax, resin, pitch, etc.; or a combination of rubber with pitch, resin, gum-resin or an oleo-resin.

Lead plaster does not keep well after being spread. It, as well as most others are best kept in sticks or rolls wrapped in paraffine paper.

Cantharides or blistering plaster is kept in mass and spread cold, but with a warm spatula. It should be freshly spread as it is injured by the air when kept exposed.

In spreading plasters a stencil or form may be cut into cardboard or a tin form may be used; the form is placed over the cloth, paper, kid-skin, silk or whatever is used (cotton drilling is as good as anything), the plaster is spread by melting and spreading with a plaster-iron, or hot spatula, the cloth is then trimmed so as to leave a margin of $\frac{1}{2}$ or $\frac{3}{4}$ inch around the plaster. The plaster should be covered with paraffine paper and rolled, or dispensed in a box.

GAUZES AND COTTONS.

Medicated gauzes and cottons are prepared mostly by specialty manufacturers, but are sometimes wanted of composition not obtainable ready made; they consist usually of sterilized cotton or gauze containing a certain per cent of an antiseptic or disinfectant agent and are used for keeping fresh wounds, etc., aseptic, and also to disinfect old sores, ulcers, etc.; they may also contain glycerine or oil and resin to keep them soft. To prepare them the medicine is dissolved in ether or a suitable volatile solvent, to this solution is added glycerine or oil and resin; the solution is then absorbed by the cotton or gauze and thoroughly diffused through it, rung out and the preparation quickly dried without heat, in the dry air; they should be prepared with the utmost cleanliness and kept in tight containers.

The proportion or percentage of medicinal matter must be related to the finished product, not to the first weight of the gauze or cotton.

INCOMPATIBILITY.

Definition.—From a pharmaceutical standpoint the term “incompatibility” means the unfitness of different drugs for association together in a medicine.

Classification.—This unfitness may be, because of the tendency to separate physically, combine chemically to form an objectionable compound, or it may be the result of therapeutic objection. Therefore we have three kinds of incompatibility, viz.:

1. Physical.
2. Chemical.
3. Therapeutical.

1. Physical Incompatibility is generally the result of insolubility, or the separating of different substances by physical process after a solution or mixture has been made; the mere fact of one substance being insoluble in another is no evidence of incompatibility, provided that with reasonable care the different ingredients can be diffused so that the doses will be of the same amount.

If however the tendency of liquids, or a solid and a liquid, to separate is so marked as to prevent the measuring of a dose before separation interferes, these substances may be considered *incompatible* and

a remedy applied, or if no remedy will suffice they should not be mixed.

There are four kinds of physical incompatibility illustrated, by

- (a) Alcoholic solutions, fluid extracts, tinctures, etc., etc., with aqueous liquids, the dissolved matter being precipitated by the change in the solvent or menstruum.
- (b) Mucilaginous and albuminous substances with strong alcohol, which precipitates gum and albumen.
- (c) Salt solutions in watery fluids, with strongly alcoholic liquids, the salt being precipitated.
- (d) Alcoholic solutions of oils with watery fluids, the oil being precipitated.

Remedies.—Incompatibility of this kind may be remedied in some cases or possibly avoided by

- 1. Order of mixing the ingredients.
- 2. Addition of protective solvents.
- 3. Emulsification or suspension by means of gums or other emulsifying agents.

The order of mixing the ingredients is sometimes the most difficult problem in the proceeding to fill a prescription; three general rules will apply:

- (1.) When strongly alcoholic liquids are to be mixed with watery solutions or those weaker in alcohol, dilute the stronger with the weaker alcoholic preparation and add the watery solution last; by this means a precipitate may either be avoided entirely or if it is formed it will be in a more finely divided condition so that it may be more readily diffused.
- (2.) In cases of resinous tinctures and camphoraceous solutions when no protective is admissible, this order should be reversed and the solution,

poured slowly or drop by drop added, to the watery liquid which must be stirred continually.

- (3.) When oils or heavy insoluble powders are to be dispensed in a large portion of fluid, it is desirable to emulsify them or incorporate with gum or a suitable agent so as to avoid separation.

2. Chemical Incompatibilities are those manifested by chemical reaction resulting in decomposition of one or more agent with formation of different compounds.

This class is the most important and the pharmacist is morally and legally accountable for their neglect. They are very persistent and almost if not quite impossible to overcome and avoid. The knowledge of chemistry is quite essential to the study of chemical incompatibilities.

The rules to be observed in case of physical incompatibilities apply here also.

Recognition of chemical reaction can be effected by evolution of gases, change of color or appearance of a precipitate. Chemical reaction occurs in dry powders as well as in the presence of liquids, though it progresses more slowly in the dry.

Incompatibilities cannot always be foretold, but certain rules or laws of chemistry govern them, and the result is always the same under like conditions.

In chemical reactions the strongest positive radical tends to unite with the strongest negative radical present.

Double decomposition will not occur between solutions of two salts, unless, by the interchange of the two baselous radicals a substance will be produced which is either insoluble or volatile.

When a solution of a compound is brought in contact with a solution of another compound, and, by an

interchange of radicals, an insoluble compound will be rendered possible, that compound will be precipitated.

When dry heat is applied to a mixture of compounds, if any volatile product can be formed by double decomposition, that volatile compound will be formed.

Most cases of chemical incompatibility arise from the formation of insoluble compounds, hence the importance of the subject of "solubilities."

3. Therapeutic Incompatibility is met with where drugs are administered together, which have a contrary or directly opposite effect upon the system, tending, when administered, to neutralize the effect of each other.

The question of therapeutics concerns the physician properly; but sometimes an oversight or error may be apparent to the pharmacist, when the physician's attention should be called to it; discretion should be used in doing so, however.

SOLUBILITY OF COMPOUNDS.

Substances.	Soluble.	Insoluble.	Remarks.
Acetates.....	All, except.....	Quinine acetate..	All soluble in HCl. and NH_3 HCl. Benzoic acid is soluble in alcohol.
Arsenites.....	Those of alkali-metals..	All others.....	
Benzoates.....	Practically all.....	Benzoic acid.....	
Borates.....	Of alkali-metals.....	Metallic.....	
Bromides.....	Most all, except.....	Pb., Hg., Ag., Bi. and Sb.	Decomposed by acids. Decomposed by all acids except HC^{n} . AgCl. dissolved by ammonia, PbCl. by hot water. Alkaline citrate solutions dissolve many salts of iron, bismuth, etc. Excess of Pot. Cym. and HC^{n} . dissolve all cyanides.
Bromates.....	Those of alkali-metals..	All others.....	
Carbonates.....	All, except.....	Ag., Pb., Hg.....	
Chlorides.....	All.....	Others.....	
Citrates.....	Alkaline citrates.....	Others.....	Decomposed by acids, liberating HC^{n} . Sol. in alcohol, excess of acid.
Cyanides.....	Potassium.....	Others.....	
Ferricyanides (Ferrocyanides)	Of alkali-metals and alkaline earths.....	Others.....	
Gallates.....	Alkali gallates.....	Others.....	
Hydrates.....	Of alkalies, alkaline earth, lead.....	Others.....	Al. Hyd. sol. in excess of Sodium or Pot. Hyd. Prone to decompose; preserved in alkaline solution. Prone to decompose. Decomposed by acids liberating iodine. Formed in presence of alkalies and alcoholic solution of iodine. Liberate nitrous acid with acids.
Hypochlorites..	All.....	Ag., Pb., Hg.....	
Hypophosphites	All.....	.....
Iodides.....	All, except.....	.....
Iodates.....	Iodates.....	Decomposed by organic matter and other reducing agents.
Iodoform.....	Iodoform.....	.....
Nitrates.....	All, except.....	"Bismuthyl".....	
Nitrites.....	All, except.....	Silver and lead.....	
Oxalates.....	Oxalates.....	All insoluble.....	Decomposed by organic matter and other reducing agents.
Oxides.....	Alkaline earths.....	All others.....	
Permanganates.	All.....	.....

INCOMPATIBLES.

Substances.	Incompatible with	Remarks.
Acids	Alkalies, alkaloids, carbonates and weaker acids.	
Acacia	Alcohol, borax, lead and ferric salts.	
Acetanilid	Spirit nitrous ether, carbolic acid.	
Alkaloids	Alkalies, iodine, iodides, bromine, bromides, tannin.	
Autpyrine	Alkalies, iodine, iodides, bromine, bromides, tannin.	
Antimony salts	Albumen, mucilage, tannin.....	Oxy-sulphide, explodes with reducing agents. Gives off CO ₂ .
Bismuthyl-nitrate	Sodium bicarbonate.....	
Bi-smuth subgallate.....	Strong acids.	
Carbolic acid	Cellodion, acetanilid, albumen.	
Croton-chloral	Alkalies	
Chloral hydrate	Alcohol, alkalies, halogen salts of alkali-metals.	
Choralamid	Alkalies.	
Creosote	Nitric acid, oxidizing agents.	
Diuretin	Strong acids.	
Europhen	Oxides of metals, starches and fats, salts of mercury.	
Essential oils	HNO ₃ and oxidizing agents.	
Fixed oils	Strong alkalies.	
Ichthyol.	Acids, alcohol, alkalies, except ammonia.	
Iodoform	Strong alkalies.	
Pancreatin	Acids.	
Pepsin	Alkalies.	
Phenacetine	Alkalies and acids.	
Salol	Strong alkalies.	
Terbene	Oxidizing agents.	

EXPLOSIVE PRESCRIPTIONS.

The following prescriptions contain most of the substances which have been found to produce explosions. Potassium Chlorate, and, in fact, all other Chlorates, should never be dispensed with organic, combustible or oxidizable bodies.

A mixture of Hypophosphite of lime, Chlorate of Potassium, and Lactate of Iron exploded and nearly killed the prescription clerk who was compounding it.

Even the simple trituration of Calcium Hypophosphite is dangerous. A young pharmacist was killed by an explosion which was caused by the shaking of a solution of this substance. Physicians not infrequently order a solution of Chromic acid in glycerine. But when the acid is added quickly and all at once to the glycerine, a readily explosive substance like nitro-glycerine is formed. Chlorate of potassium, when mixed with tannin or muriate of morphia, often explodes. The combination of iodine and preparations of ammonia must be made cautiously, as iodide of nitrogen is formed, which explodes on the slightest touch. Indeed, one ought to be very careful in ordering and compounding mixtures in which easily reducible substances enter, such as the chlorates, the hypophosphites, the nitrates, preparations of iodine or ammonia, chromic acid, glycerine, permanganate of potash, etc.

The following, taken from physicians' prescriptions, are dangerous, and have caused serious accidents.

R. Potassa Chlorate,
Pulvis Catechu.

M.

R. Potassa Chlorate,
Sodii (or Calcii) Hypophosphite, Aqua.

M. Dissolve the two salts separately or an explosion will occur.

R. Potassa Permanganate,
Glycerine.

M. This is almost sure to cause an explosion.

R. Acid Nitric,
Acid Muriatic,
Tr. Nux Vomica.

M. Exploded in about two hours.

The following prescription cannot be prepared without an explosion:

R. Lactis Sulph.
Antimonii Sulph. Aurant, aa. Gr III
Zinci Valeri. " I
Potass. Chlorate. " II

M. Ft. Pulv. Dentur. doses, tales, No. XII

R. Argenti Oxide, ,
Morphia Muriate,
Ext. Gentian.

M. This mixture has exploded.

R. Turpentine,
Acid Sulphuric.

M. Mix slowly in a large, open vessel.

R. Potassa Permanganate,
Alcohol,
Aqua.

- M. Mix the alcohol and water; add the potash slowly and cork loosely.
- R. Potassa Chlorate,
Acid Tannic,
Glycerine.
Aqua.
- M. Dissolve the tannin in the glycerine, the potash in water, and mix.
- R. Potassa Chlorate,
Tr. Ferri Chloridi,
Glycerine.
- M. This is liable to cause an explosion when warmed.
- R. Soda chlor.,
Antim. Sulph. Aurat.
- M. Takes fire even when triturated very gently.

SYNONYMOUS NAMES.

- Aqua Saturni, Liq. Plumbi Subacet.
 Aqua Sedativa, Sedative Water.
 Aqua Javelle, Liquor Potassæ Chloratae.
 Aqua Luciae, A kind of liquid soap.
 Aqua Phagedœnica Flava, Lotio Flava.
 Aqua Phagedœnica Nigra, Lotio Nigra.
 Acidum Phenicum, Carbolic Acid.
 Acetum Saturni, Liquor Plumbi Subacetatis.
 Acetum Plumbi, Liquor Plumbi Subacetatis.
 Aquila Alba, Calomel.
 Balsamum Traumaticum, }
 Balsamum Friar's, } A compound Tr. of
 Balsamum Jesuit, } Benzoin.
 Balsam de Maltha, }
 Basham's Mixture, Liq. Ammo Acetatis.
 Boulton's Solution, Liquor Iodi Carbolatus.
 Bark, A term applied to the different species of Cin-
 chona.
 Bland's Pills, Pilulæ Ferri Carbonatis.
 Bitter Salz, Magnesia Sulphas.
 Blutwerzel, Bloodroot.
 Carbasus Iodoformata, Iodoform Gauze.
 Crocus Martis, Oxide of Iron.
 Carron Oil, Lime Liniment.
 Calomelas, Calomel.
 Decoctum Zitmanni, A compound decoction of Sar-
 saparilla.
 Elixir Curassao, Elixir Curacao.
 Extract Goulard, Liquor Plumbi Subacetatis.
 Fleming's Tinct. of Aconite, Aconite root 10 oz.
 Troy Alcohol Q. S. 15 f oz.

Flores Benzoës, Benzoic Acid.
 Ferri Quevenne's, Reduced Iron.
 Gossypium Stypticum, Stiptic Cotton.
 Glonoin, Nitro-glycerine.
 Goulard's Extract, Liquor Plumbi Subacetatis.
 Gummi Mimosæ, Gum Acacia.
 Gutta Bateman, Bateman's Pectoral Drops.
 Gutta Nigra, Acetum Opii.
 Heira Picra, Pulvis Aloes et Canellæ.
 Iodine Caustic, Liquor Iodi Causticus.
 James' Powder, Pulvis Antimonialis.
 Jesuits Balsam, Tr. Benzoin Comp.
 Kali or Kalium, Potassa.
 Lac Fermentatum, Kumyss.
 Liquor Arsenicalis, Fowler's Solution.
 Labarraque's Solution, Liquor Sodæ Chloratae.
 Lapis infernalis, Nitrate of Silver.
 Mistura Gummosa, Mistura Acaciæ.
 " Basham, Liq. Ammo. Acetatis.
 Mercurius, Mercury.
 Mercurius Bismuthi, Subnitrate of Bismuth.
 Number Six, Tinctura Capsici et Myrrhæ.
 Natri or Natrium, Sodium.
 Natro, Kali acidulum tartaricum, Rochelle Salts.
 Nihilum Album, Oxide of Zinc.
 Oleum Anthos, Oil Rosemary.
 Oleum Harlemensis, Harlem Oil.
 " De Cedro, Oil of Lemon.
 " Carron, Lime Liniment.
 " Waldwooll, Oil of pinus pumilis.
 Opodeldoc, Linimentum Saponis Camphorata.
 Opodeldoc, Is often written when Linimentum
 Saponis is wanted.
 Pilulæ Ad Prandium, Dinner Pills.
 Pulvis Kurellæ, Comp. Licorice powder.
 Quevenne's Iron, Reduced Iron.

Solution Labarraque, Liquor Sodæ Chloratæ.
 Solution Donovan, Liquor Arsenii et Hydrargyri
 Iodidi.
 Solution Monsel's, Liquor Ferri Tersulphatis.
 Solution Boulton, Liquor Iodi Carbolatus.
 Solution Vleminck's, Liquor Calcis Sulphuratæ.
 Solution Lugol's, Liquor Iodi Compositus.
 Solution Fowler's, Liquor Potassii Arsenitis.
 Solution Villate's, Mistura Adstringens et Eschar-
 otica.
 Sal Monsel, Persulphate of Iron,
 Sal Amarum, Epsom Salts.
 Sal Mirabile, Plumbe's Salts.
 Spiritus Glonoini, a one per cent. solution of nitro-
 glycerine in alcohol.
 Spiritus Mindererus, Liquor Ammonii Acetatis.
 Spiritus, Alcohol.
 Species Laxantes, St. Germain Tea.
 " Pectorales, Breast Tea.
 Syrupus Doveris, Syrupus Ipecacuanhæ et Opii.
 Thebaica, Opium.
 Tinctura Warburg, Tinctura Antiperiodica, N. F.
 Tinctura Pectoralis, Pectoral Tincture N. F.
 " Huxham's, Compound Tincture of Cin-
 chona.
 Tincture Thebaica, Tinc. Opium.
 " Ferri Pomata, Tincture of Ferrated Ext.
 of apples.
 Theriaca }
 Treacle } Molasses.
 Unguentum Matris, Mother's Salve.
 Zinci Flores, Oxide of Zinc,

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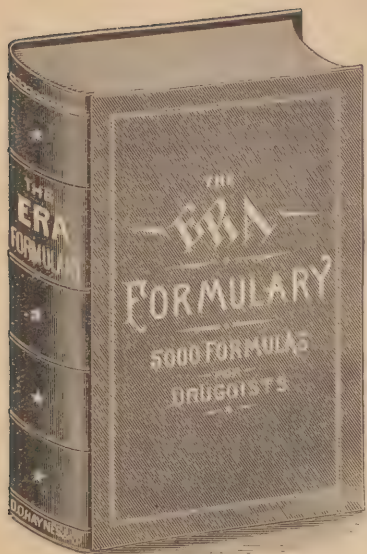
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